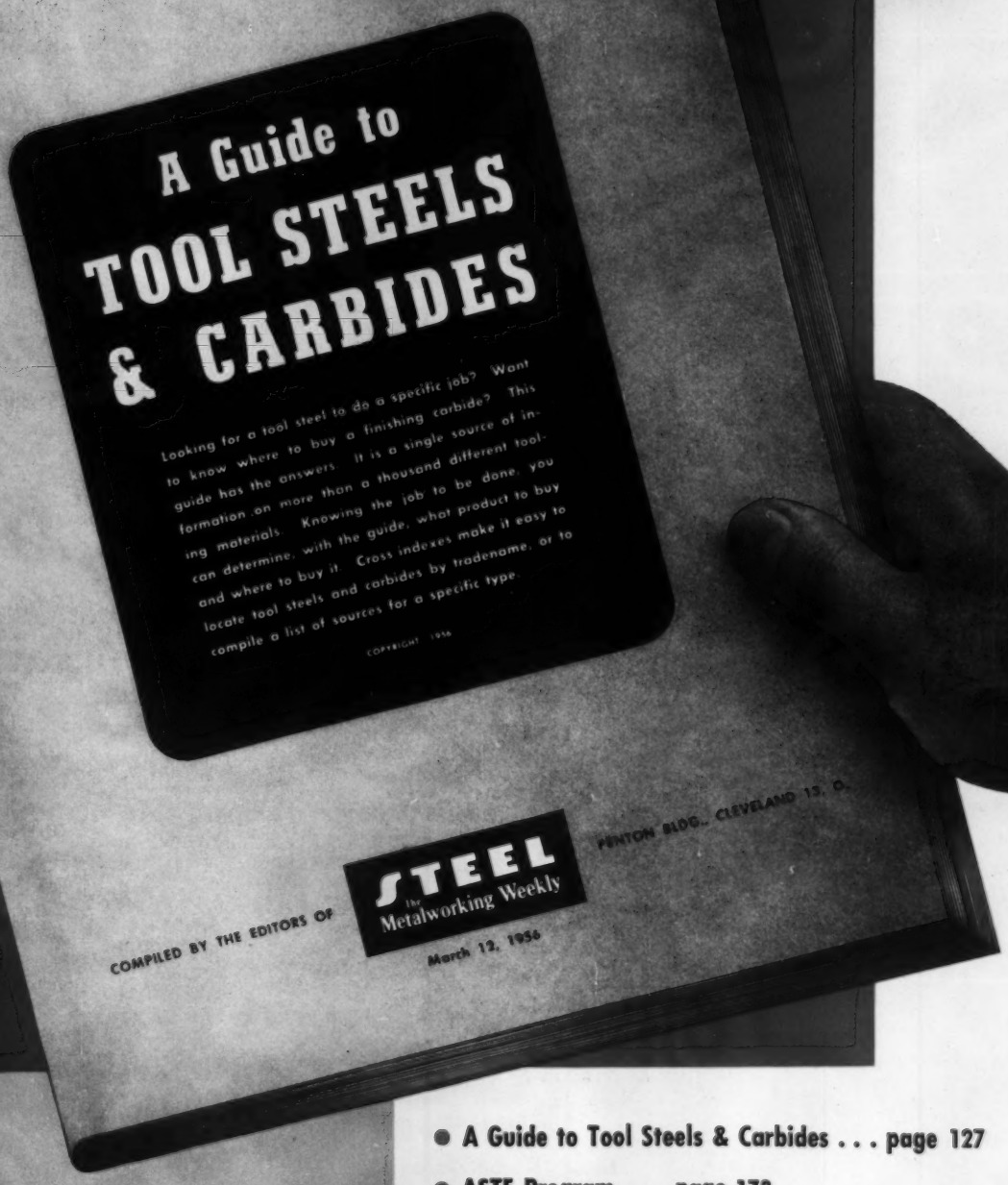
MARCH 12, 1956

STEEL
The Metalworking Weekly


A Guide to
TOOL STEELS
& CARBIDES
Looking for a tool steel to do a specific job? Want to know where to buy a finishing carbide? This guide has the answers. It is a single source of information on more than a thousand different tooling materials. Knowing the job to be done, you can determine, with the guide, what product to buy and where to buy it. Cross indexes make it easy to locate tool steels and carbides by tradename, or to compile a list of sources for a specific type.
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COMPILED BY THE EDITORS OF
STEEL
The Metalworking Weekly
March 12, 1956
PENTON BLDG., CLEVELAND 13, O.

TOOL SHOW ISSUE

- A Guide to Tool Steels & Carbides . . . page 127
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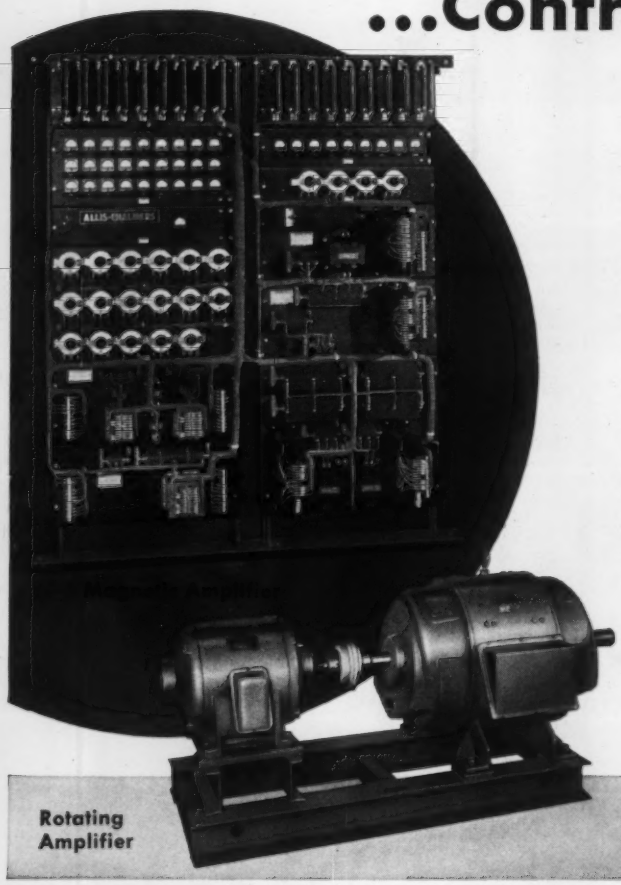
You get **MORE** when you Specify Allis-Chalmers

...More Mill Production ...Control Over Quality



Rotating Amplifier

The most important factor in meeting the challenge of more tonnage and improved quality is effective regulation. And effective regulation is more than a matter of good regulator design. It embraces overall *system* design . . . the integration of generators, exciters, motors, regulators and other control equipment. As manufacturer of all these interdependent components, Allis-Chalmers is in a unique position to provide this practical approach to mill regulation.

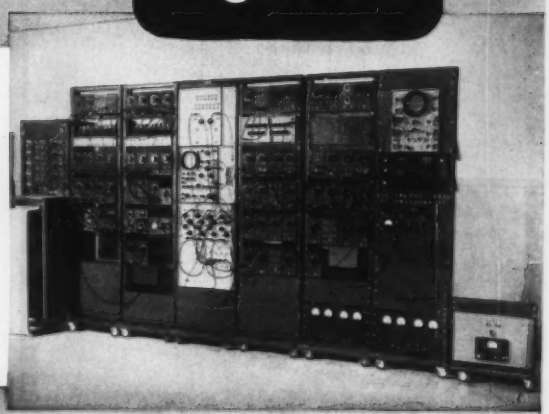
"Coordineered" System

Allis-Chalmers maintains separate departments, staffed by specialists, for each product. "Coordineering" results from an interdepartment exchange of ideas and technical information correlated in *one* department specializing in metals-producing industry application. All components are matched to meet the requirements of your job. Responsibility for system performance rests with one company.

For complete information, see your Allis-Chalmers representative or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

A-5029

ALLIS-CHALMERS
Regulators



Three Types of Regulators Available

The following types of regulation are "coordineered" into an Allis-Chalmers system:

1. ***Regulex* Rotating Amplifier** — Applicable where high power levels for reversible output are desired.
2. **Magnetic Amplifier** — Applicable where low power levels for reversing or high power levels for non-reversing are desired.
3. **Combinations of *Regulex* Rotating and Magnetic Amplifiers** — Each complements the other for maximum efficiency.

Analytical Facilities Utilized . . .

System performance is simulated in the computers to get optimum configuration of components. The constants and exciter ceilings necessary for desired response are established.

Regulex is an Allis-Chalmers trademark.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS

Tool Steel Topics

BETHLEHEM STEEL

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

Blanking Die of Lehigh H Produces 15,000 Shotgun Hammers Between Grinds

A minimum of 15,000 shotgun hammers between grinds, with occasional runs as high as 20,000—that's the kind of performance they're getting with Bethlehem Lehigh H in a blanking operation at Milford Tool & Die Co., Milford, Mass. And the operation isn't easy, for it involves an intricate section, heavy weight of stock, and heavy scale condition.

The die is hardened to Rockwell C 59-60, and operates in a 70-ton press. It blanks 8620 hot-rolled alloy steel, ¼ in. thick, the finished part looking much like a piece to a jigsaw puzzle. From 0.004 to 0.006 in. is removed in redressing.

Lehigh H is our special-purpose high-carbon, high-chromium tool steel. It is easy to machine, and undergoes minimum distortion in heat-treatment, resulting in high compressive strength. Lehigh H is a deep-hardening steel. It has good wear-resistance, and is safe for intricate dies having sharp corners.

If you would like to try Lehigh H in your shop, you'll find your tool steel distributor anxious to be of service. Call him at any time. Lehigh H may also be obtained direct from our mill depot.

NEW COLOR FILM ON TOOL STEEL

You'll like our new educational motion picture, "Teamwork." The film takes you behind the scenes in describing the manufacture, quality-control, heat-treatment, and end-uses of Bethlehem carbon, oil- and air-hardening, shock-resisting, hot-work, and high-speed tool steels.

"Teamwork" is in color, with sound. It is on 16-mm film, and has a running time of 30 minutes. It's ideal for showing to distributors, die-makers, machine-tool manufacturers, heat-treaters, machinists and technical societies, as well as engineering students.

If you would like to borrow a print, write to Publications Department, Room 1008, Bethlehem Steel Company, Bethlehem, Pa., selecting a showing date as far in advance as possible.

BETHLEHEM TOOL STEEL ENGINEER SAYS:

Multiple Tools Improve Hot-Work Tool Life

All hot-work tools are subject to heat-checking, a type of surface-deterioration consisting of shallow cracks, usually in network form, which lengthen and enlarge gradually during service. The cracks stem from the repeated thermal stress set up each time the tool is used. During use, portions of the tool surface are heated rapidly by contact with the work, causing expansion; subsequently natural cooling, or some type of forced cooling, causes contraction. Repeated cycles of expansion and contraction produce stresses which lead eventually to heat-check cracks which shorten tool life.

If multiple tools are used alternately, the severity of thermal stress in each operation is decreased, thus retarding heat-checking, and lengthening tool life. A typical example is in hot-piercing punches. Often as many as six punches are provided, and used alternately in a rotating fixture which permits rapid placing and removal of the tools. The life of each tool is often doubled in this manner. However, wherever multiple hot-work tools are used, some degree of improvement in tool life may be expected.

Production Doubled

Product Improved...

TOCCO heating station with inductor and fixture for silver brazing cylinder and cylinder cap assemblies.

with TOCCO* Induction Heating

The experience of The Commercial Shearing and Stamping Company, who use TOCCO for silver-brazing hydraulic cylinder assemblies, is typical of the benefits obtained by America's leading metal-working plants who use TOCCO Induction Heating for brazing, hardening, heat-treating, forging and melting operations.

More Production with TOCCO

a. Heating time per piece cut from 15.3 minutes to 2 minutes on 5¼" I.D. cylinder.

b. Machining and cleaning operations, formerly required, are not needed after TOCCO brazing.

Lower Costs with TOCCO

a. Through a reduction in time required for each piece.

b. Through the elimination of scrap and reworks.

c. Because, since TOCCO is automatic, operator need not be trained or especially skilled.

Improved Product with TOCCO

a. Because of better looks and sales appeal.

b. Because distortion is minimized.

c. Because of elimination of field failures due to severe stress pockets.

TOCCO Engineers — can probably find applications in your plant, too, where TOCCO Induction Heating can increase output, cut unit costs and improve your product. Such a survey costs you nothing—and may save you a great deal.

THE OHIO CRANKSHAFT COMPANY

TOCCO

Mail Coupon Today

NEW **FREE** BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. S-3, Cleveland 1, Ohio

Please send copy of "Typical Results of TOCCO Induction Brazing and Soldering."

Name_____

Position_____

Company_____

Address_____

City_____ Zone____ State_____

Traveloader... revolutionizes long load handling!

Here at last is a practical answer to the awkward problems of yard handling and particularly those nightmarish long loads. Traveloader combines the unique ability to pick up, carry and stack long, unwieldy or multiple pallet loads—indoors or out. Operating over paved or unpaved roadways, it does the job fast, safely, and much cheaper than other equipment.

This one machine, with one operator, replaces two and often three fork trucks, portable cranes or straddle carriers, and does the job better. You save manpower, cost of buying and maintaining other expensive equipment, aisle space, and time. Because Traveloader loads from the side and carries loads lengthwise, it requires much less aisle space than fork trucks.

Unlike a straddle carrier, this new machine can stack up to 12 feet high. And when traveling, the load is nested safely aboard the Traveloader's deck, eliminating dangerous dangling and swaying of load, distributing load evenly over four large wheels, and making speeds up to 30 MPH practical and safe.

Write for descriptive bulletin No. 1360.

ONLY TRAVELOADER

Picks up like a *straddle* truck • Delivers like a *highway* truck • Stacks like a *fork* truck

Baker handling equipment

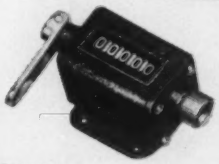
THE BAKER-RAULANG COMPANY

1259 WEST 80th STREET • CLEVELAND 2, OHIO

A subsidiary of Otis Elevator Company

5T4

Here's THE basic V-R "COUNTER-PACKAGE" for INDUSTRY...



SMALL RESET COUNTER

A compact, rugged reset counter for moderate duty in parts inspection, quality control, conveyors, machine tools, light presses, etc.

Dimensions: 1¾" long, 1 15/64" high, 1 3/16" wide

Speed: Up to 1000 counts per minute.

BOX-TYPE RESET COUNTER

For punch press installations, conveyors, metal-working equipment, die casting, plastic-molding, rivet, spring and wire machining, or any installation requiring a heavy duty counter.

Dimensions: 4¼" long, 2 21/32" high, 3 3/8" wide.
Speed: 500 counts per minute.

RESET MAGNETIC COUNTER

For remote indication of machine operation from plant to office.

Dimensions: 3 1/16" long, 2½" high, 1⅝" wide.

Speed: Up to 1000 counts per minute.

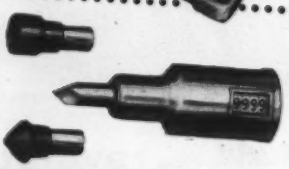
Coils: 110V-AC are standard. Other voltages are available. Panel mounting feature also available.

HAND TALLY

For quick spot-checks of production or performance.

Dimensions: 1 17/64" long (to end of reset knob), 1¾" deep, 2" high.

Counts one for each depression of the thumb lever, and resets to zero by a turn of the knob.



CLUTCH SPEED COUNTER

For checking to make sure that the machine is operating at the required R.P.M.

Dimensions: 3¼" long, ⅜" max. diameter. Non-Reset.

Internal clutch operates counter only when rubber tip is pressed against the shaft.

Here are 5 of the most widely used Veeder-Root Counters in industry . . . and they're immediately available from stock at leading Industrial Supply Distributors. There are Veeder-Root mechanical, electrical and manual counters for use in production recording and control, wage payment, time study work, quality control. In fact, you can profitably apply Veeder-Root Counters to every machine, operation, process or system in your plant. Ask your own Industrial Supply Distributor. Or write Veeder-Root Inc., Hartford 2, Conn.

Everyone can count on

VEEDER-ROOT

"The Name that Counts"

Insist on Standard

VEEDER-ROOT COUNTERS

from your

Industrial Supply Distributor

or write us on special problems

STEEL
The Metalworking Weekly

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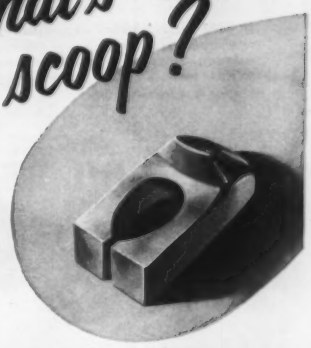
what's the scoop?



it's SEYMOUR NICKEL SILVER of course!

Take a close look at one of the "scoops" — or hooks — in the slide fasteners which play a key role in your daily living.

The *best* slide fastener scoops are made of Seymour Nickel Silver flat wire. They are formed on high speed machines that produce up to 300,000,000 of these tiny parts every day. Yet, so precise is the operation that tolerances are held to half-thousandths of an inch!

Because its uniform composition and temper enable it to undergo precise forming on high speed machines, Seymour Nickel Silver meets these requirements perfectly. It will not discolor materials — it is long wearing and corrosion resistant — it has the necessary eye appeal. Best of all, it has the *natural lubricity* which makes fasteners work smoothly and without sticking. These enviable qualities have helped make Seymour the leading supplier of nickel silver wire for the slide fastener industry.

Beyond that, Seymour's readiness to produce nickel silver alloys in strict conformity to users' needs has prompted many manufacturers to say . . . "SPECIFY SEYMOUR — You KNOW it's good!"

SEYMOUR

THE SEYMOUR MANUFACTURING CO.
3 Franklin Street, Seymour, Connecticut

1941 ——— 1956

As TMI passes another important milestone in the precision service of American Industry, the successes of our yesteryears indicate new and even greater recognition for this familiar symbol:

The Mark of Quality TMI

CEILING UNLIMITED

Design and research engineers' ultra-performance demands on stainless steel and alloy tubing require a "ceiling unlimited" on our ability to produce it to almost infinite precision tolerances. That means no limit to experience or equipment capacity to fuse the characteristics of these metals with cold drawing processes required to attain the delicate sizing and shaping by the new industrial age of supersonic flying, absolute automation, atomic power, advanced plastics, etc.

SMALL DIAMETER STAINLESS STEEL AND ALLOY TUBING FOR TOP FLIGHT APPLICATIONS

We specialize in small diameters, .050" to .625" O.D., in tolerances as close as .001", in perfect finishes, inside and outside. And: in solving tubing problems! Your inquiries are always welcome and receive prompt attention.

TUBE METHODS INC. METALLURGISTS ENGINEERS • MANUFACTURERS

BRIDGEPORT (Montgomery County), Pa.

behind the scenes

Get Your Guide Here

Early last October, STEEL's editorial team grouped itself loosely about the ninth floor conference table. Members riffled scratch pads, licked freshly sharpened pencils and assumed attitudes of deep thought. They had assembled to consider special issues for 1956.

"Looks like we have to get out another Tool Steel Guide," said Editor Walt Campbell between his teeth; they were clenched on a dead cigar, and if he had uttered the round, pear-shaped tones approved by Dale Carnegie, the cigar would have landed on his notes like the contents of a vacuum cleaner bag. "We're still getting requests for the 1952 issue, and that guide is not only out of date—it's also out of print. Look into it, will you, Bob?"

And that's how Robert Huber, machine tool editor, became the father of the 40-page insert, "A Guide to Tool Steels and Carbides," beginning on page 127 of this week's STEEL.

"I had no idea we'd get so much interest and co-operation," he said. "This is our third guide, you know. The first one came out in 1947, in response to a big demand for tool steel information. Every copy was snapped up like crazy. Well, five years later we came out with a bigger one. It had 32 pages and 1087 listings, and even though *it's* out of print, too, as well as being out of date, we're still getting requests for it!"

The 1956 Tool Steel Guide contains a net gain of 600 listings, including seven manufacturers' lists of ceramic cutting tools. It is such a valuable reference work, 10,000 extra copies were printed. They are available, first come, first serve, at $2 a copy.

Associating with Drums?

Henry H. George, foundry sales representative, Buffalo, does us the honor of wondering if we have a clipping service, and then immediately assumes that we do not—because he sends a clipping from the Feb. 11 *New Yorker*.

Thank you, and we don't, and you're right. The clipping Mr. George sent concerned a complaint against a cabaret by a neighbor who refused to be sent by calypso singers and drummers. The calypso singer, Monica, a yummy dish from Santo Domingo, was all mixed up. We quote from the clipping: "This man obviously doesn't like calypso singing or drums," derstandinvbgqjypy shrdlu fw9 Monica said, with masterful understatement.

"If that's a sample," commented the *New Yorker*, "we don't like it, either."

Mr George was startled to see shrdlu in there. "It all goes to prove," he said, "one can't be too careful about the company one keeps."

Press Prexy Impressed

Right across the hall from our modest coop decisions of great moment are made every day behind closed doors. These portals insure the privacy of J. R. Dawley, Penton Press manager. One recent day J. R. opened our door, waved and pointed to a clipping in his free hand. "Here's something," he remarked, "you can print in that thing of yours. I particularly like that last line."

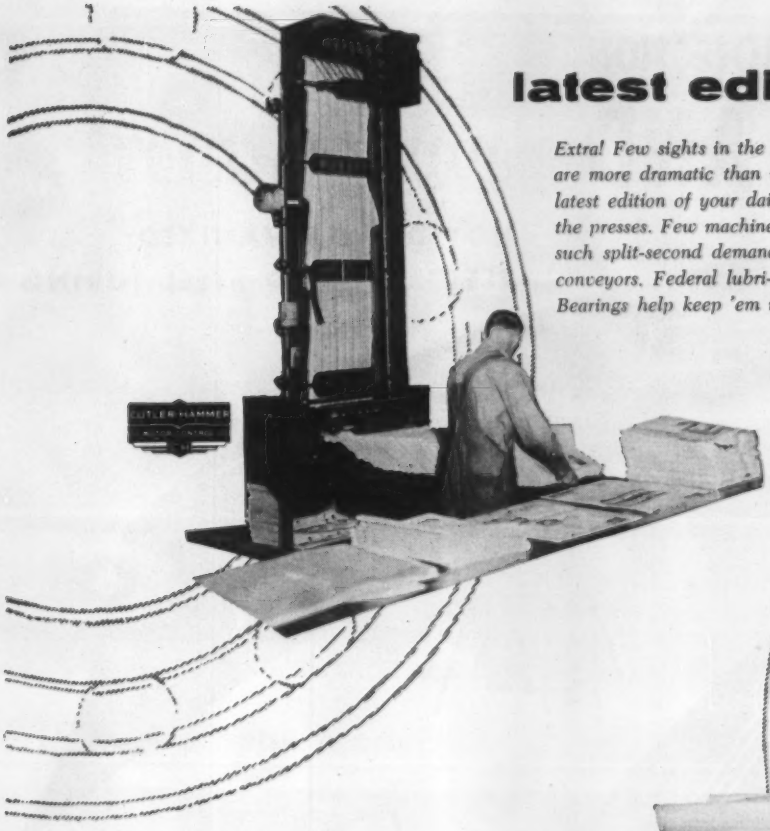
It was an employee notice, from Reid Vance of the Ohio Printers Federation, Columbus, O., and was titled "Work Break."

"Due to increased competition and a keen desire to remain in business," it stated, "we find it necessary to institute a new policy—effective immediately. We are asking that somewhere between starting and quitting time, and without infringing too much on the time usually devoted to lunch periods, coffee breaks, rest periods, story telling, ticket selling, vacation planning and the rehashing of yesterday's TV programs, that each employee endeavor to find some time that can be set aside and known as the 'Work Break.'

"While the adoption of the Work Break plan is not compulsory, it is hoped that each employee will find enough time to give the plan a fair trial. It is also hoped that those employees not in favor of adopting the Work Break idea, will have fully completed their vacation plans."

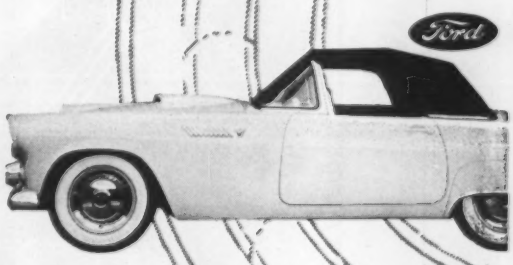
Shrdlu

(Metalworking Outlook—Page 77)



latest edition...

Extra! Few sights in the machine age are more dramatic than watching the latest edition of your daily paper roll off the presses. Few machines have to meet such split-second demands as newspaper conveyors. Federal lubri-sealed Ball Bearings help keep 'em rolling.



...or latest model

So much of a car's smooth, quiet running performance and safety depends on its ball bearings! And millions come off the automotive assembly lines, precision-equipped with Federal Ball Bearings.

so much of industry *turns* on FEDERAL ball bearings

Whether you're behind the headlines or headlights – or make hoists or harvesters . . . Whether you work in a machine shop or office – you'll find Federal Ball Bearings on the job. Hundreds of types – over 12,000 sizes – all produced by this 50-year-old company devoted *exclusively* to the manufacture of anti-friction ball bearings.

When Federal Ball Bearings are a part of so many things you *use*, shouldn't they be a part of the things you *make*?

New! Ball bearing and engineering data! 175 pages full in FEDERAL'S NEW CATALOG! To get your copy, just drop us a line.

THE FEDERAL BEARINGS CO., INC. • POUGHKEEPSIE, N. Y.

Federal Ball Bearings

One of America's Largest Ball Bearing Manufacturers

UMBRELLA OF PROTECTION

WHEATLAND

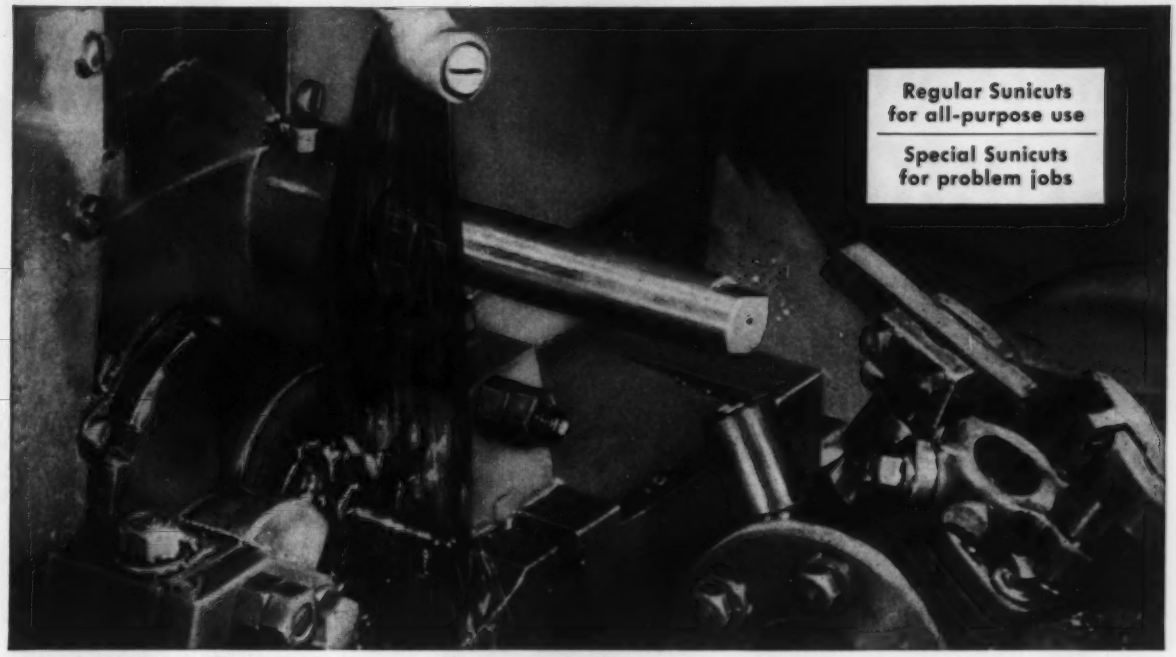
WHETHA-TUBE

HOT DIP GALVANIZED
ELECTRIC WELD STEEL TUBING

WRITE TODAY
for samples and information on
WHEATLAND
WHETHA-TUBE

To improve the utility and wearability of your product there is no finer protection than Hot Dip Galvanized Zinc. Each length of WHEATLAND WHETHA-TUBE is individually immersed in a vat of molten Zinc—giving a complete coating—inside and out. This process adds weight and longer life to electric weld steel tubing by providing rust protection and is actually alloyed to the steel so that in your bending operation it does not flake off. You will find that Hot Dip Galvanizing also adds to the quality appearance of your finished product.

WHEATLAND TUBE COMPANY — **BANKERS SECURITIES BUILDING • PHILADELPHIA, PA.**
MILLS: WHEATLAND, PENNSYLVANIA, DELAIR, NEW JERSEY



to assure peak production . . .

THERE'S A SUNICUT OIL FOR EVERY SCREW MACHINE OPERATION

Today's Sunicut cutting oils are the result of years of research and on-the-job testing. And they're versatile, too. In many plants *all* screw machine jobs are being handled by a single Sunicut grade.

For the problem jobs, Sun makes a wide variety of special Sunicut oils, each designed to do the job better.

Your Sun representative has the practical know-how to analyze *your* problems. Working with Sun's experienced engineering staff, he's ready to help you pick the Sunicut oil that will give you the tolerances and finishes you want.

The Sunicut series for screw machines is only part of a large selection of non-emulsifying and emulsifying cutting oils available to help you get peak production at the lowest possible cost.

For complete information about Sun cutting oils see your Sun representative... or write Sun Oil Company, Philadelphia 3, Pa., Dept. S-3.

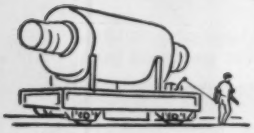
SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

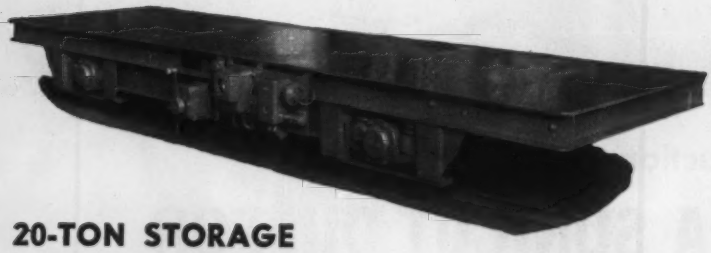
SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

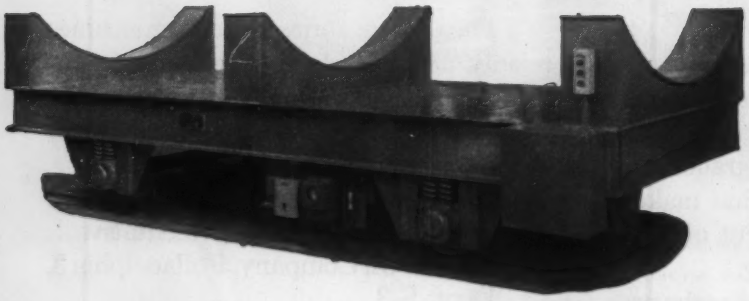
ATLAS SAFETY TYPE "SHORT HAUL" TRANSFERS



Atlas Safety-Type Transfers provide safe, low-cost service. Available with gas or diesel-electric, cable reel, or storage battery power. Atlas Transfers handle any type of load . . . and the heavier the load, the greater the savings.



20-TON STORAGE BATTERY FLAT CAR



20-TON STORAGE-BATTERY WITH CRADLE FOR PIPE

Request "Walk-Along" Bulletin 1283

THE ATLAS CAR & MFG. CO.

ENGINEERS MANUFACTURERS

1140 IVANHOE RD. CLEVELAND 10, OHIO, U. S. A.

LETTERS TO THE EDITORS

Men of Industry Policy

On Jan. 17, I sent you the following notice:

Mr. Robert A. Armstrong was elected a member of the Board of Directors of Michigan Seamless Tube Company, South Lyon, Michigan, at the Annual Stockholders' Meeting held January 17, 1956.

Mr. Armstrong retains his position as Executive Vice President. He has been associated with the Company since 1934 and was formerly Executive Assistant to the President, and prior to that, Vice President in Charge of Sales.

We have checked each edition and find you have not published this announcement. Is there any reason why it should be ignored?

Wm. A. McHattie
President
Michigan Seamless Tube Co.
South Lyon, Mich.

• *Space limitations make it impossible for us to print all promotions, elections and changes in the metalworking industry that are submitted.*

We have developed a formula for the selection of material: Only those people (titles) our readers are most likely to come into contact with are mentioned in "Men of Industry."

We feel that few readers do business with a member of a board of directors; and we do not include this group.

Finds New Insight

May I compliment the editors of STEEL for the interesting Program for Management, 1955. Data, facts and practical conclusions certainly will serve the purpose aimed at.

Reading the articles was not only a source of knowledge, but mainly a new way of seeing things within an organization. Unfortunately, three articles of the series are missing: "Cut Costs To Preserve Profits" (Mar. 14, page 93); "Better Plant Layout" (Apr. 18, page 93); and "Business Communications" (May 16, page 103). May I have a copy of each?

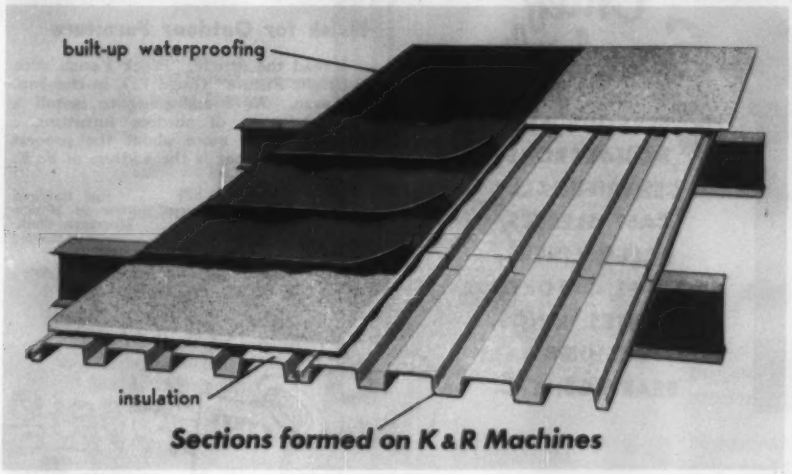
J. O. Nascimento
Manager
Brazaco S/A
Sao Paulo, Brazil

Group Expresses Agreement

I have just read your informative article, "More Work for Water" (Jan. 30, page 84). This philosophy is identical to that preached by our organization—a private, nonprofit association organized to insure that the conservation of the natural resources of the Westfield River Valley becomes a reality. We have a

(Please turn to page 12)

THIS is the way "Robertson" forms STEEL DECK FLOORING



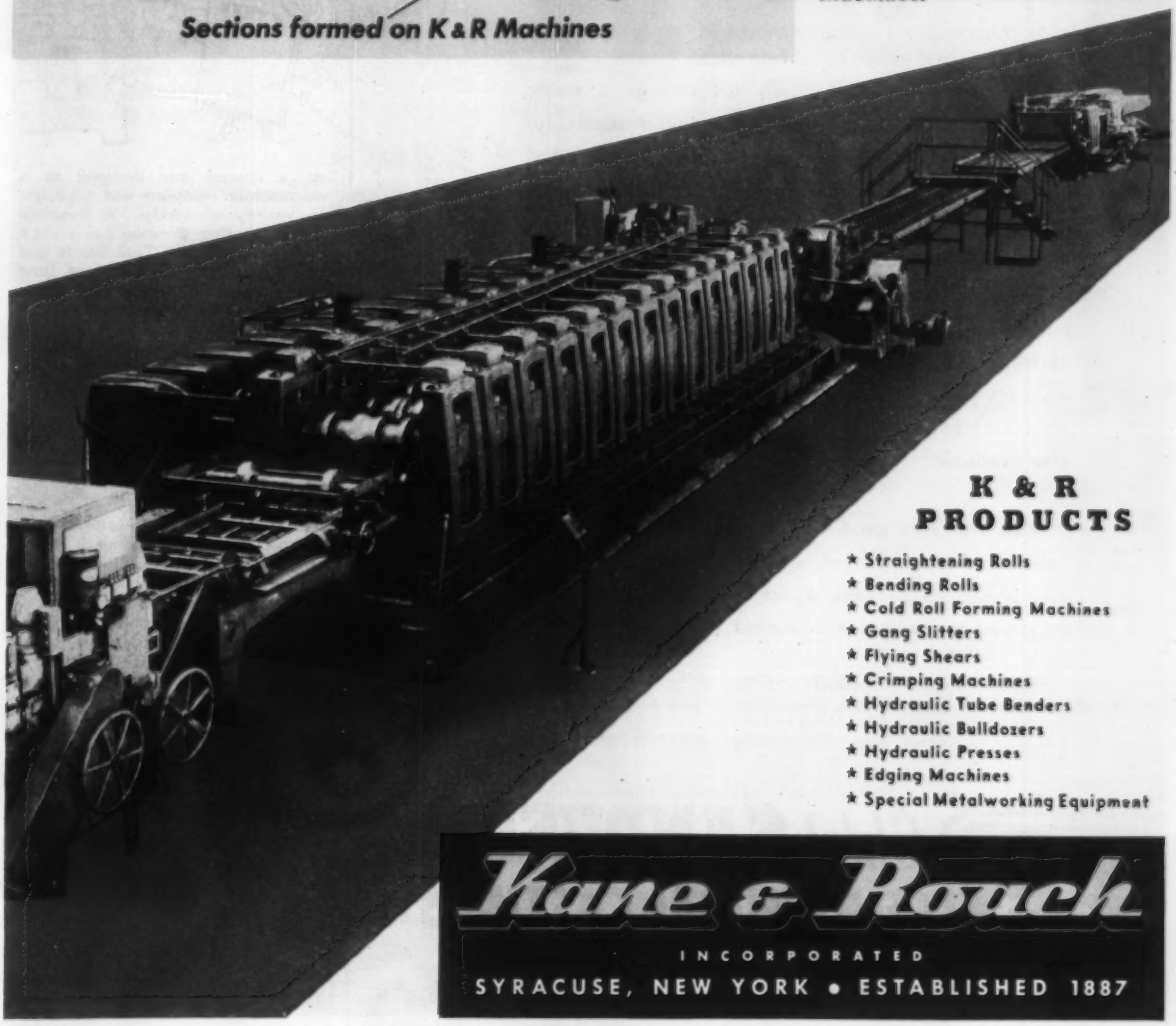
Sections formed on K & R Machines

To meet the heavy demand for their Q Deck #3 and other sections

H. H. ROBERTSON

has installed the new production line shown.

The forming of these sections is accomplished by the use of three K & R forming machines *(arranged in straight line production)* consisting of one 14 stand and two 4 stand K & R No. 5LS Cold Rolled Forming Machines.



K & R PRODUCTS

- ★ Straightening Rolls
- ★ Bending Rolls
- ★ Cold Roll Forming Machines
- ★ Gang Slitters
- ★ Flying Shears
- ★ Crimping Machines
- ★ Hydraulic Tube Benders
- ★ Hydraulic Bulldozers
- ★ Hydraulic Presses
- ★ Edging Machines
- ★ Special Metalworking Equipment

Kane & Roach

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FERROUS AND NON-FERROUS CENTRIFUGALLY CAST SLEEVES, ROLLS, LINERS, TUBES, RETORTS, CHUTES, RINGS, BUSHINGS, BEARINGS, ETC.

Our continuing development program is a major factor in meeting your ever increasing demands for ferrous and non-ferrous centrifugal castings. And research is a vital phase in keeping ahead of your requirements.

Precise metallurgical control is maintained throughout the entire manufacturing process to produce strong, uniform, close-grained castings which are extremely resistant to heat, corrosion, and abrasion. Excellent machining facilities for turning, boring, and drilling are also available.

You can rely on Chief Sandusky as a versatile integrated centrifugal specialist where castings are produced to your specific requirements with modern, up-to-date equipment.

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Chief SANDUSKY CENTRIFUGAL CASTINGS

FERROUS AND NON-FERROUS

SANDUSKY FOUNDRY AND MACHINE CO., Sandusky, Ohio

LETTERS

(Concluded from page 10)

membership of about 1000 individual, organizational, industrial and community members. May we have reprints to distribute in this area?

Warren B. McGranahan
Executive Director
Westfield River Watershed Association
Woronoco, Mass.

Finish for Outdoor Furniture

I read the article, "Black Finish with a Bright Future" (page 72), in the Jan. 23 issue. As I am going to install a small business of outdoor furniture, I wish to know more about the process described. What is the address of E. F. Houghton & Co?

Joel Ramirez
Altos Hornos de Mexico
Monclova Coah.
Mexico

• *The address is: 303 W. Lehigh Ave., Philadelphia 33, Pa.*

New Guide to Tool Steels

I am a special tool designer at a business machine company and must use a wide variety of steels. A business associate in another division has a copy of "Guide for Selecting Tool Steels and Carbides," a reprint from STEEL of June 16, 1952. I find it useful and would appreciate your advising me on how I may secure a copy.

Ronald A. Hendry
15913 Lennane Ave.
Detroit 39, Mich.

• *A new edition of this guide is published in this issue. Reprints are available at $2 per copy.*

Favorable Reception

Several months ago, we reprinted from the July 25 issue copies of your excellent editorial. "Know Your Costs" (page 39), and the article, "What Cost Price Fighting?" (page 41).

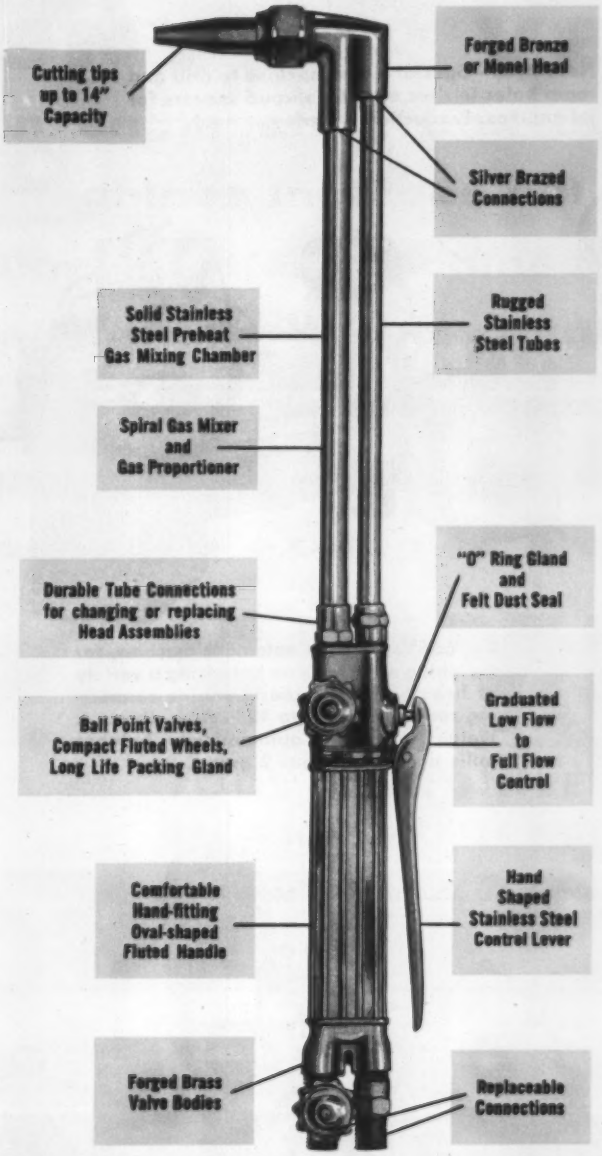
I thought you would like to know that the reception accorded these reprints was quite favorable, and we received quite a number of requests for additional copies. Thanks for allowing us to use this material in reprint form.

George Eaton
Executive Secretary
National Tool & Die Manufacturers Association
Cleveland

Growth Story Approved

Please send three reprints of "It's Time To Grow" (Feb. 13, page 81). This is a good article, and you are to be complimented on it.

C. W. Hosterman
Assistant General Manager
Electronics Division
Sylvania Electric Products Inc.
Woburn, Mass.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Replaceable Connections

VICTOR CUTTING TORCHES

Try this torch on your toughest cutting job . . . you'll find it keeps a cool head . . . time tested Victor spiral mixer and gas proportioner assures safe, economical operation.

Note clean lines . . . try its comfortable balance and hand-fitting handle . . . quality construction assures trouble-free performance and ease of repair and replacement of damaged parts.

Choice of Monel (MO) or bronze (ST) heads . . . four control lever positions to suit every operator preference and job need. Four lengths: 21″, 27″, 36″ and 48″, available with 90°, 75°, 45° (ST Models only) or 180° angle heads.

Why experiment? Ask your Victor dealer to demonstrate this field-tested, operator approved torch on your hottest, toughest cutting job. Call him NOW.

FOUR LEVER POSITIONS

Model ST 1000 or MO 1000

Model ST 1100 or MO 1100

Model ST 1200 or MO 1200

Model ST 1300 or MO 1300

For maximum efficiency and safety use genuine Victor tips and parts.

Listed by Underwriters Laboratories, Inc.

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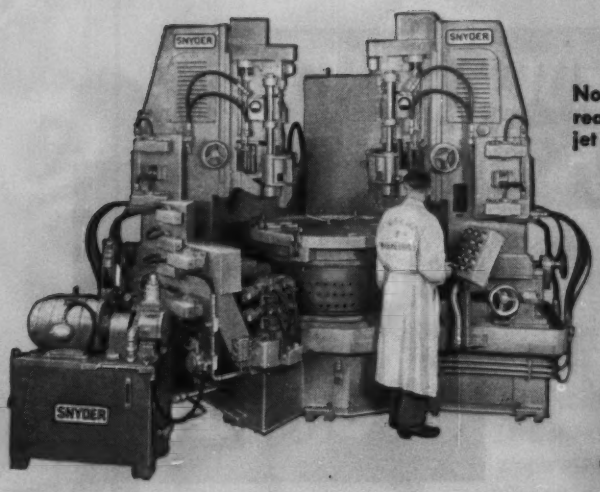
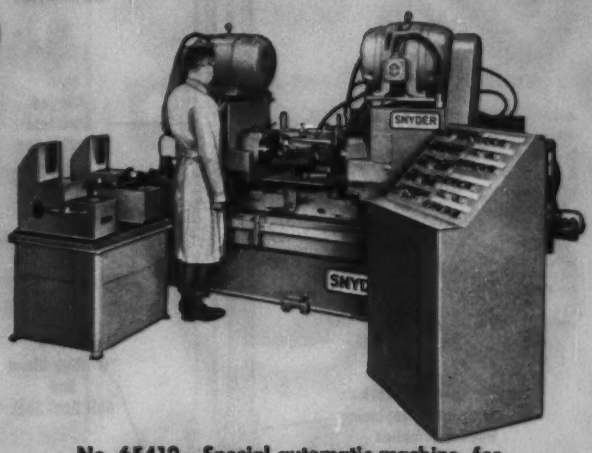
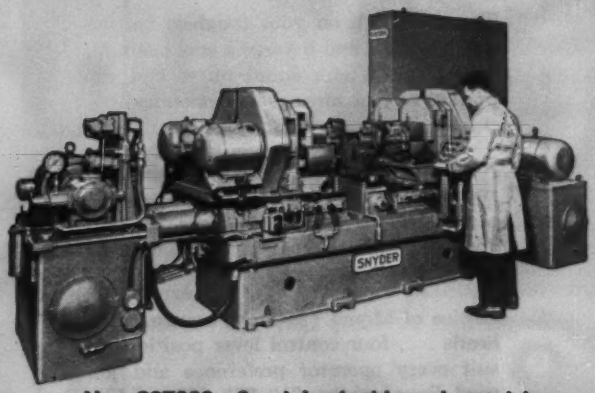


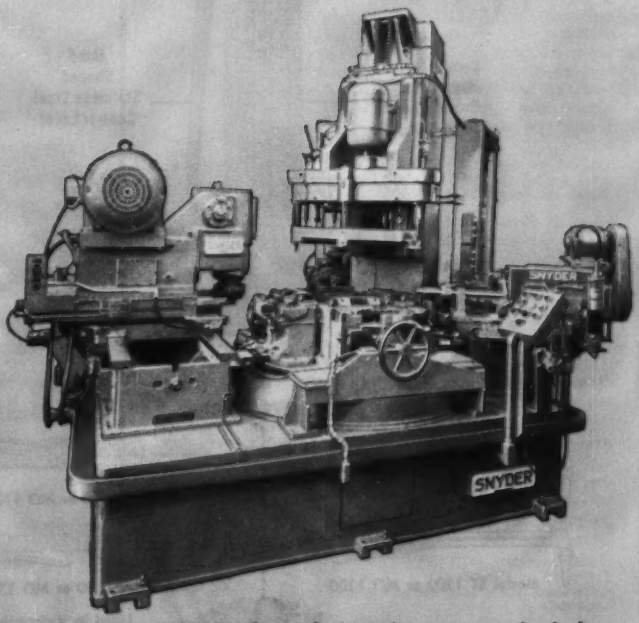
No. 70165—Special index machine to drill and ream holes in rims of outer shroud spacers for jet engines. Production 2 parts per hour.



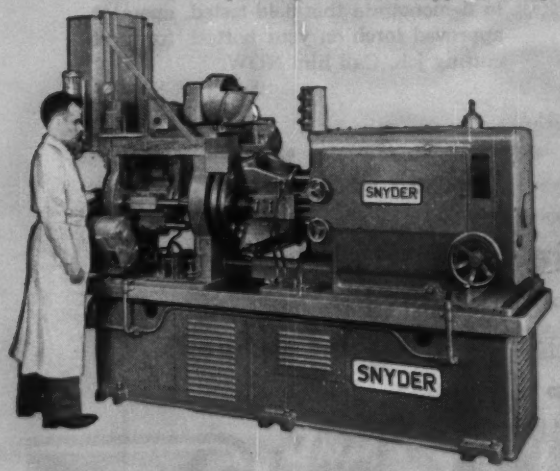
No. 65412—Special automatic machine, for weighing and precision balancing a variety of heavy-duty and diesel engine connecting rods from 7⅜" to 12" center distance. Weighs rods and automatically balance mills to plus or minus 2 grams.



No. 207390—Special, double-end precision boring machine for finish boring, counterboring and chamfering counter shaft, intermediate and shifter shaft holes on power take-off cases. Production 82 pieces per hour at 80% efficiency.



No. 73902—Special 4-station automatic index machine for milling joint face, drilling and reaming vertical and horizontal holes in exhaust manifolds. Production 80 pieces per hour at 80% efficiency.



No. 68526—Special double end trunnion machine, fully automatic, for machining special aircraft rivets. Machine is automatically loaded and unloaded. Production rate varies with size of rivet.

SNYDER VERSATILITY

in engineering and building metal-cutting machines includes not only the great Snyder line transfer machines with automation, but also many smaller and diversified machines in which the standards of performance and economy are no less exacting. A few representative examples are shown.

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TOOL & ENGINEERING COMPANY

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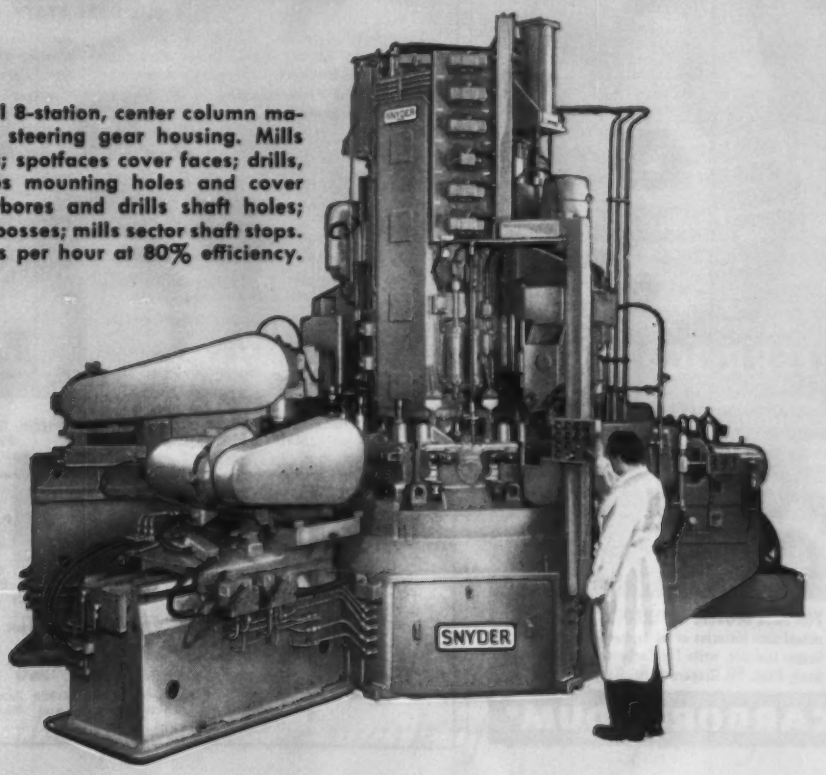
31 Years of Special Machine Tools with Automation



No. 72976½—Special 8-station, center column machine for processing steering gear housing. Mills pads and cover faces; spotfaces cover faces; drills, countersinks and taps mounting holes and cover holes; rough counterbores and drills shaft holes; mills two Welch plug bosses; mills sector shaft stops. Production 260 pieces per hour at 80% efficiency.

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ONE OF THE NATION'S LARGEST AND MOST MODERN PRODUCTION FOUNDRIES

ESTABLISHED 1866

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Users everywhere report similar experiences. In fact, on 57 machining tests in 11 large machine shops, castings of gray iron treated with FERROCARBO averaged 89.5% greater machinability per tool than untreated castings. These premium castings are finer-grained, denser, stronger, yet they COST YOU NO MORE... because your foundryman, using FERROCARBO, makes worthwhile savings in raw material costs.

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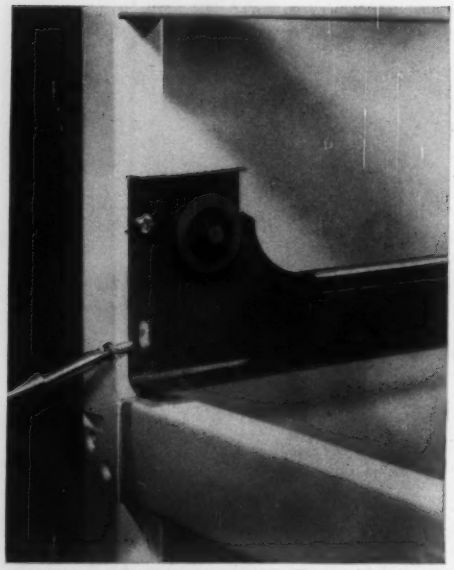
PHILLIPS CROSS RECESSED HEAD SCREWS

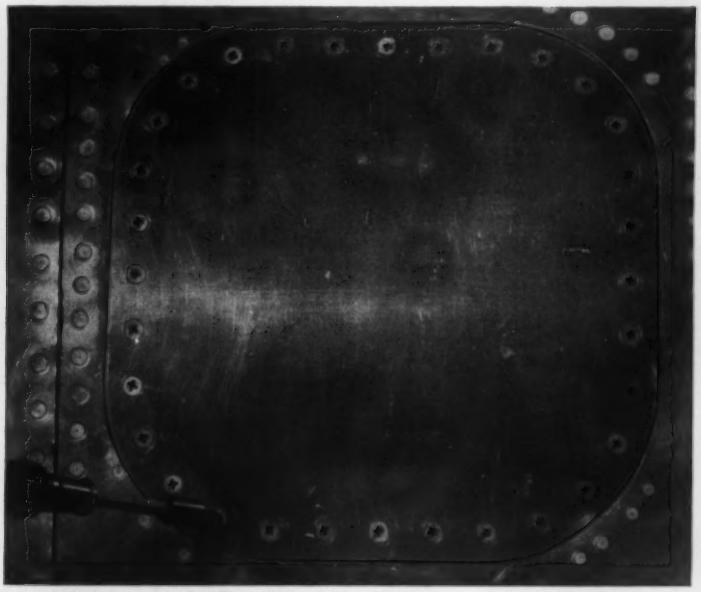
These fasteners of today — and of the future — are manufactured by the companies listed on the fourth page of this folder.

X marks the spot . . . the mark of extra quality

INACCESSIBILITY of the screw location on this Stewart-Warner Corporation fuel valve unit is no problem with Phillips screws. "With our Phillips screws, the entire installation of six screws takes but a few seconds in almost effortless fashion," says Mr. Mosbarger, chief administrative engineer of the company.



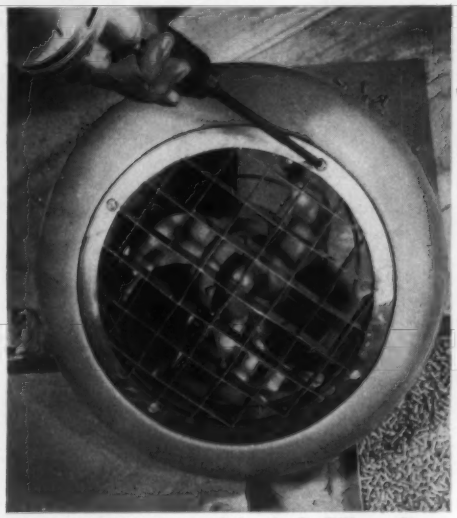
CONSTANT VIBRATION on this Tracy Kitchens drawer guide roller requires the tight fit afforded by Phillips screws. Mr. Krywick, general manager, says, "Phillips screws have eliminated costly redoing and increased production by enabling us to use power drivers."



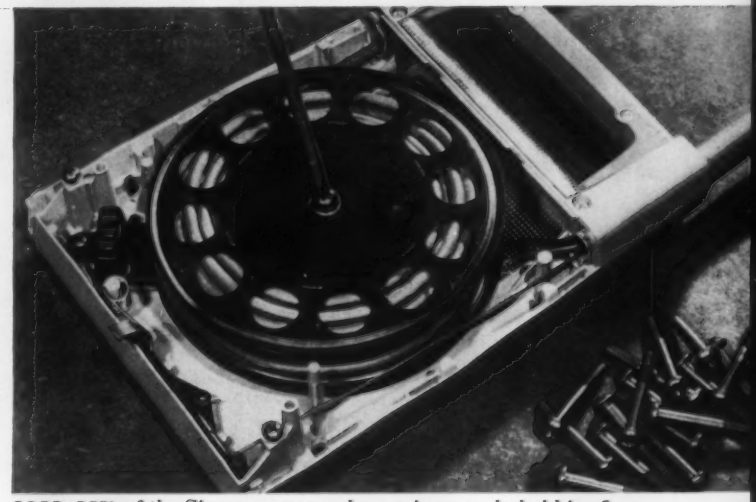
ACCESS PLATE on the Republic Aircraft Corporation's Thunderstreak is tightly fitted with Phillips screws. Phillips head screws give greater speed of assembly and positive gripping recess which prevents damage due to slippage.

Users Get Positive Gripping, Quick Assembly and Neat Appearance with

PHILLIPS CROSS RECESSED HEAD SCREWS



GRILL INSTALLATION of the A. C. Gilbert Company fan is made with Phillips screws. Mr. Morse, electrical engineer of the company, says, "We have learned that where tight fitting, neat appearance and speed of assembly is to be coupled with production efficiency Phillips head screws are the best we can use."



CORD REEL of the Singer vacuum cleaner is securely held in place with ¼" Phillips head fasteners. "With Phillips we maintain peak production," says Francis A. Gall, Vacuum Cleaner Engineer, "and greatly enhance the beauty of our new design with a flush-fitting installation."

ANODIZED ALUMINUM Phillips head screws are used to securely hold the Sargent & Company lock to the door. "With Phillips screws more positive engagement with the driver we are getting better fastening, less damage to the lock due to slippage," states Sargent Product Engineer.

MANUFACTURERS OF PHILLIPS CROSS-RECESSED-HEAD SCREWS

THE FASTENERS OF TODAY... AND OF THE FUTURE

X marks the spot

... the mark of extra quality

Pledged to highest standards...

The Phillips Screw manufacturers listed here cooperate to turn out a uniformly high standard of quality. As sponsors of the Phillips Cross-Recessed-Head Standards Committee they adhere to the established dimensional standards. gauges, and gauging methods which will best serve industry.

Look to them for **X** *-tra quality Phillips Cross-Recessed-Head Screws*

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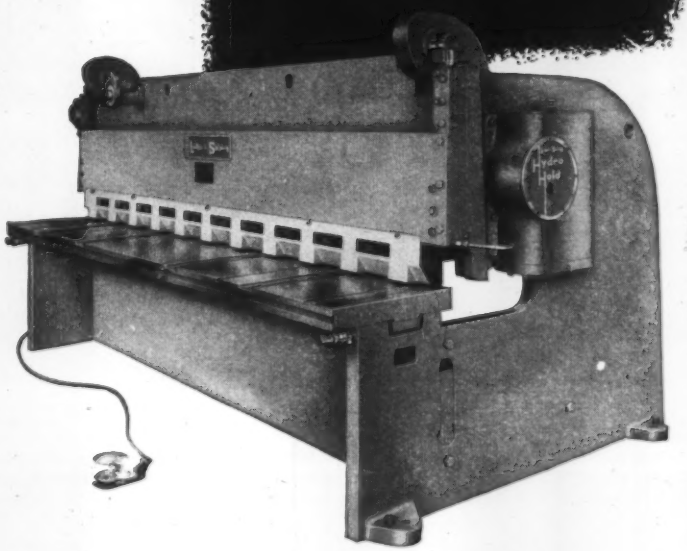

Model 0610 Power Squaring Shear, ⅜" x 10' capacity

Lodge & Shipley is producing Shears equal or superior to any other. This is a fact backed up by the experience of many users who find that Lodge & Shipley Shears offer more in features, performance and low-cost maintenance.

Built to Lodge & Shipley standards of strength and accuracy, these new shears assure clean cutting to precision limits . . . smooth, safe operation . . . fast, convenient adjustments and money-saving freedom from maintenance. Lodge & Shipley Shears are available in a wide range of capacities to suit any shearing requirement. Each is a profitable investment.

Call the Lodge & Shipley representative. He'll gladly point out special features that can be important to you and arrange a demonstration.

Write for FREE Bulletin No. PS-7 and the name of your nearest distributor

THE **Lodge & Shipley** COMPANY

3070 Colerain Avenue
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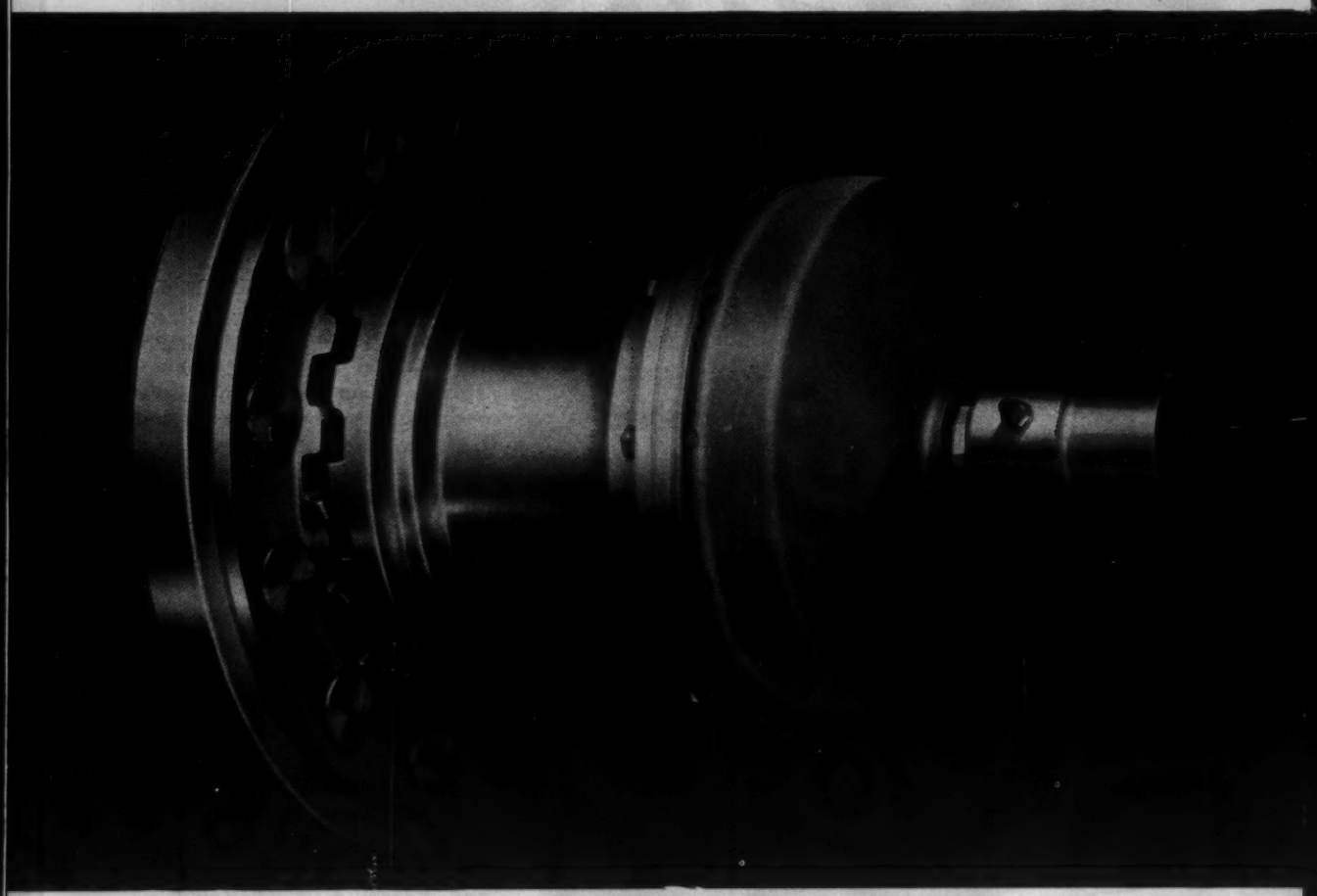
Exclusive NIAGARA Electro-

A prime factor in the operating economy



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There, in a nutshell, you have one of the principal reasons why Niagara presses continually out-perform all others. For fact-loaded details, as applied to single or double crank inclinable, gap frame, horn and deep throat presses, request specific literature and consult with a Niagara representative.

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greater output, safety and of Niagara Presses

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- ENGAGES AND DISENGAGES INSTANTLY at any point in the stroke.
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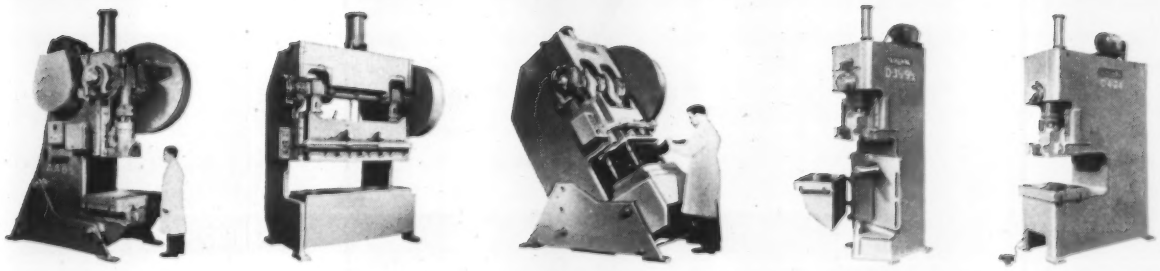
- LOW INERTIA. Small in diameter. Operates directly on crankshaft, *the slowest rotating shaft.* No gears nor high speed shafts, etc. to start and stop
- LENGTHENS GEAR LIFE. Wear is distributed uniformly, because engagement load is not always applied to same teeth.
- RUNS IN SEALED BATH OF OIL to minimize wear.
- EASILY ACCESSIBLE. Mounted at end of shaft, external to flywheel.
- NO BUCKING of clutch vs. brake.



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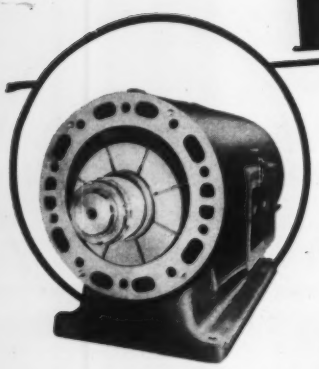
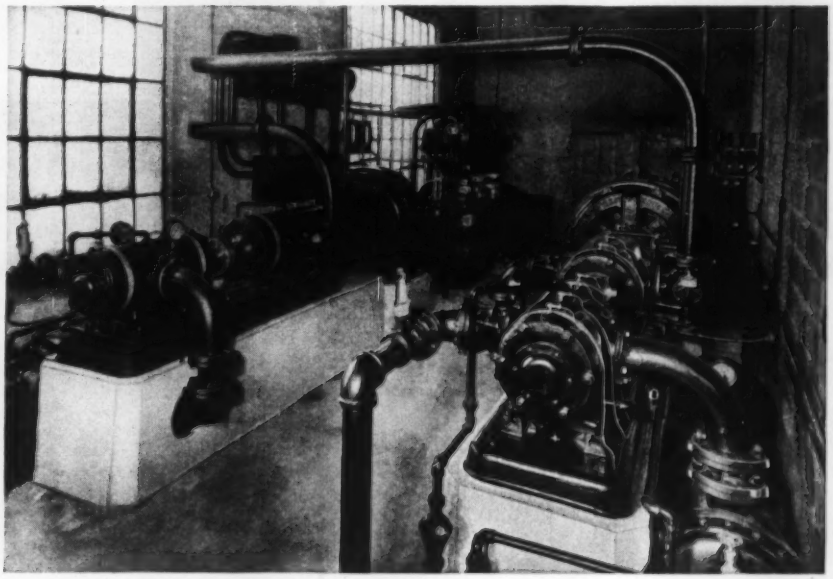
Fuller pioneered



the two-stage rotary compressor . . . for general industrial use . . . starting in 1930



INSTALLED 1930
STILL GOING STRONG

Two Fuller Rotary Two-stage Compressors. Capacity each 740 c.f.m., 100-lb. pressure.

Fuller Company not only pioneered the rotary compressor for industrial use in this country, but it has always stressed the "spotting" of compressors. There's nothing new or startling about this principle . . . Fuller has advocated it ever since its first machines were put on the market in 1930 . . . applying each compressor to a specific job, with resultant overall plant economy, as well as power savings. Result: the adoption of this economical layout by thousands of users has proved to their satisfaction the soundness of such a program.

Fuller has built and sold thousands of Fuller Rotaries—a large proportion of the two-stage type. And, when plant expansion is necessary, with a consequent demand for more air, additional Fullers are naturally installed.

Fuller engineers have never rested on their oars, but have continually worked to improve design and efficiency, until today, these machines are second to none for dependable air-production in industry.

We welcome the opportunity to present to you all the facts concerning Fuller Rotary Compressors, facts built on actual operational experience. For a complete description of Fuller Rotaries, write for Bulletin C-5A.

FULLER COMPANY, 160 Bridge St., Catasauqua, Penna.

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C-275
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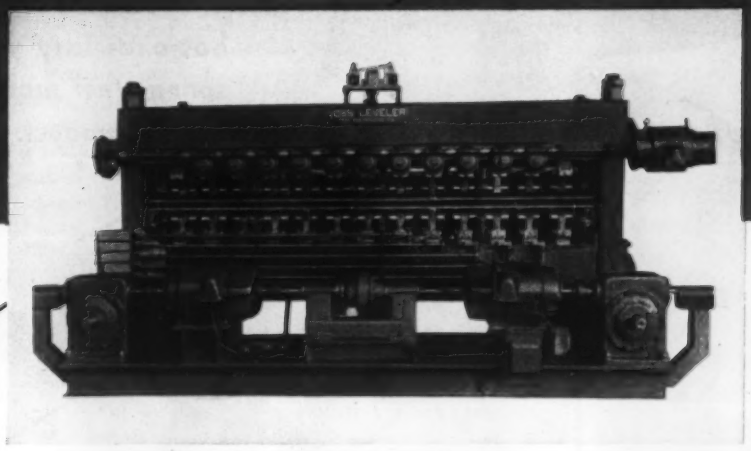
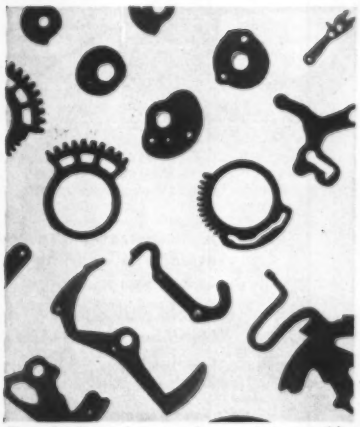
Fuller

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

How to inject exacting flatness standards into your products without slowing output from your strip or plate department



this VOSS LEVELER built by BLISS



Easy-feeding advantage has made it possible to use small Voss Levelers to flatten and stress-relieve stamped machinery parts like these.

If customer demands for dead-flat sheet, strip or plate are cutting into your production, it's time you investigated a Voss Leveler. This remarkable machine practically eliminates the leveling bottleneck by flattening material to stretcher-leveler standards at roller-leveler speed.

The machine is basically a roller leveler with long, slender, individually-driven work rolls supported by a series of short, heavy back-up rollers that maintain the longitudinal alignment of the work rolls and provide precise control of the deflections produced in the material passing through the machine.

By special arrangement with Voss Engineering Company, Bliss builds Voss Levelers to customers' requirements for flattening any of a wide range of gages and widths of ferrous or non-ferrous materials, including sheets, strip, and stamped or perforated parts. Speeds range up to 1200 feet per minute, depending on the gage and temper of the material.

So . . . if your present flattening methods aren't fast enough for you or precise enough for your more exacting customers . . . write us now for a copy of the new leaflet describing Voss Levelers and their applications.

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SINCE 1857

E. W. BLISS COMPANY, General Office: Canton, Ohio
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STRIP for action . . .

The efficient action of a Flat Spring is dependent upon the quality of the STRIP STEEL.

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has over fifty years of experience in solving spring steel problems, to guarantee the quality of your product.

Flat Tempered and Untempered Wire in .50 to 1.25 Carbon Range.

Flat Cold Rolled Strip 6" and Narrower, Bright, Galvanized, Tinned and Cadmium Finish.

Round Untempered Low and High Carbon Spring Wires.

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WASHBURN

104

CLEAN, UNIFORM BILLETS—STRIP—RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES

CALENDAR
OF MEETINGS

Mar. 12-14, International Acetylene Association: Annual meeting, Hotel Statler, Los Angeles. Association's address: 30 E. 42nd St., New York 17, N. Y. Secretary: H. F. Reinhard.

Mar. 12-15, National Electrical Manufacturers Association: Mid-winter meeting, Edgewater Beach hotel, Chicago. Association's address: 155 E. 44th St., New York 17, N. Y. Managing director: Joseph F. Miller.

Mar. 12-16, National Association of Corrosion Engineers: Annual meeting and exhibit, Hotel Statler, New York. Association's address: 1061 M & M Bldg., Houston 2, Tex. Executive secretary: A. B. Campbell.

Mar. 13-15, Radio-Electronics-Television Manufacturers Association: Spring meeting, Biltmore hotel, New York. Association's address: 777 14th St. N. W., Washington 5, D. C. Secretary: James D. Secrest.

Mar. 14-16, American Society of Mechanical Engineers: Aviation conference, Hotel Statler, Los Angeles. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 14-16, Pressed Metal Institute: Annual Spring technical meeting, Carter hotel, Cleveland. Institute's address: 3673 Lee Rd., Shaker Heights, O. Managing director: H. A. Daschner.

Mar. 18-20, American Machine Tool Distributors Association: Spring meeting, Hotel Statler, Detroit. Association's address: 1900 Arch St., Philadelphia 3, Pa. Executive secretary: Thomas A. Fernley Jr.

Mar. 19-20, Steel Founders' Society of America: Annual meeting, Drake hotel, Chicago. Society's address: 606 Terminal Tower, Cleveland, O. Executive vice president: F. Kermit Donaldson.

Mar. 19-21, American Society of Mechanical Engineers: Spring meeting, Multnomah hotel, Portland, Oreg. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Mar. 19-21, Society of Automotive Engineers Inc.: National production meeting and forum, Hotel Statler, Cleveland. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: John A. C. Warner.

Mar. 19-23, American Society of Tool Engineers: Industrial exposition and annual convention, International Amphitheatre and Conrad Hilton hotel, Chicago. Society's address: 10700 Puritan Ave., Detroit, Mich. Executive secretary: Harry E. Conrad.

Mar. 22-23, American Hot Dip Galvanizers Association: Annual meeting, Drake hotel, Chicago. Association's address: 1806 First National Bank Bldg., Pittsburgh 22, Pa. Secretary: Stuart J. Swensson.

Apr. 1-5, American Society of Mechanical Engineers: Oil and gas power conference, Jung hotel, New Orleans. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: C. E. Davies.

Apr. 4-6, American Institute of Steel Construction Inc.: Spring meeting and national engineering conference, Lehigh University, Bethlehem, Pa. Institute's address: 101 Park Ave., New York 17, N. Y. Secretary: M. Harvey Smedley.

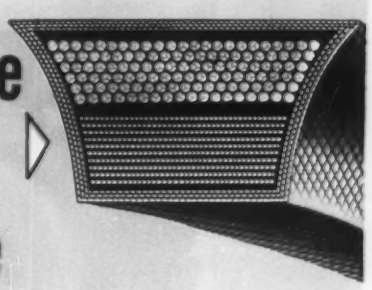
Apr. 4-6, American Society of Lubrication Engineers: Annual meeting and exhibit, William Penn Hotel, Pittsburgh. Society's address: 84 E. Randolph St., Chicago 1, Ill. Administrative secretary: William P. Youngclaus Jr.

Apr. 4-6, Rail Steel Bar Association: Annual meeting, Boca Raton hotel and club, Boca Raton, Fla. Association's address: 38 S. Dearborn St., Chicago 3, Ill. Secretary: W. H. Jacobs.

Apr. 4-7, National Screw Machine Products Association: Annual meeting, Schroeder hotel, Milwaukee. Association's address: 2860 E. 130th St., Cleveland 20, O. Executive vice president: Orrin B. Werntz.

Apr. 8, Packaging Machinery Manufacturers Institute: Spring meeting, Dennis hotel, Atlantic City, N. J. Institute's address: 342 Madison Ave., New York 17, N. Y. Executive director: R. L. Sears.

Why this curve lengthens V-belt life



THE CONCAVE SIDES (U.S. Patent 1813698) of every Gates V-Belt are a precisely engineered curve. This curve greatly lengthens V-belt life for this interesting reason:

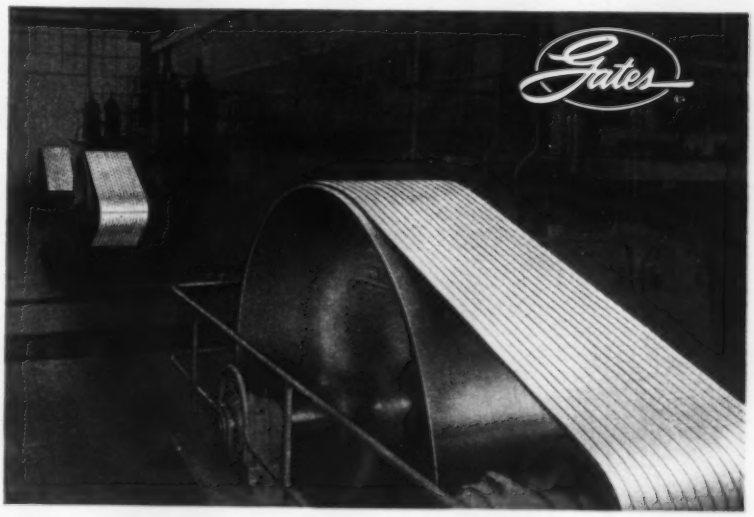
When you bend a Gates V-Belt, just as it is bent around a sheave, the concave sides (Fig. 1) become straight. Therefore, the belt makes full contact with the sheave, gripping the sides evenly (Fig. 1-A) and wear is distributed uniformly across the sidewalls of the belt. Naturally, uniform wear lengthens belt life; saves on replacement costs and cuts down-time.

Now see what happens when you bend a straight-sided belt. (Fig. 2) Just feel the sidewalls *bulge out* at the bend. The bulge causes *uneven* contact with the pulley, as in Fig. 2-A. And uneven contact causes excessive wear at points shown by arrows; belt life is shortened.

Cut costs by getting longer wear from your V-belt drives. Specify Gates Vulco Rope—the V-belt with concave sides. Your nearby Gates distributor will supply your needs promptly. The Gates Rubber Co.—*World's Largest Maker of V-belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA-74



Gates VULCO ROPE Drives

MEET
THE MOST COMPLETE CUTTING TOOL LINE
MORSE CARBON TOOLS

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He's got the most complete line . . . the right cutting tools for every operation from the automated production lines of the biggest mass manufacturers, to the smallest job shop.

Carbon . . . high speed . . . tungsten carbide, tipped or solid . . . you name it and he's got it . . . *right now, when you want it! He can recommend the right tool for any job,* regardless of tool requirements. That's why Morse means "The Most" in Cutting Tools . . . because your Morse-Franchised Distributor can do *the most* for you . . . any time you call on him. So call on him today for any current requirements.

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3 Basic Reasons Why

ALCO STEEL RING FORGINGS

are Better

1 *Because ALCO makes its own steel . . .*

ALCO metallurgists and the customer determine the mix for the steel best suited for each type of ring forging application. This means grain size and deoxidation can be controlled; creep and impact properties can be determined; proper grain flow for stress distribution can be achieved. The result: you get the finest custom-made steel for your product.

2 *Because ALCO facilities are designed for precision manufacture . . .*

In every step of production, from ingot slicing to finishing, the very latest in precision equipment and production techniques are utilized. In the rolling operation, for example, hundreds of different rolls are employed for shaping outer and inner contours. ALCO machinists can produce either rough rings or rings machined to the most exacting tolerances and finish requirements.

3 *Because ALCO quality control guarantees specific properties . . .*

Throughout the entire manufacturing process, many types of mechanical and electronic testing devices are available for checking specific properties. These include tests for hardness, grain size, microstructure, nonmetallics, jominy, fatigue, impact, bend, corrosion, creep and inner soundness. You are assured of consistent quality in your finished products.

We invite you to talk with your nearby ALCO *representative to learn for yourself how* ALCO *ring forgings can be profitably incorporated in your product. Contact him today, or for more information send for our illustrated brochure. Sizes range from 18" OD to 145" OD.*

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Gray Iron Castings
Meet Critical Quality Requirements
in a Wide Range of Applications
In applications where more than ordinary quality is required, Eaton Permanent Mold Gray Iron Castings provide a number of desirable characteristics:
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Uniform structure throughout the casting
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These qualities particularly recommend Eaton Permanent Mold Gray Iron Castings for such uses as high pressure control mechanisms, refrigeration and air conditioning parts, power steering and power braking components, household appliance parts, and for many other critical applications.
Eaton engineers will be glad to discuss the application of Eaton Permanent Mold Gray Iron Castings to your products.
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HEAD WORK... saves time ...controls and speeds production!

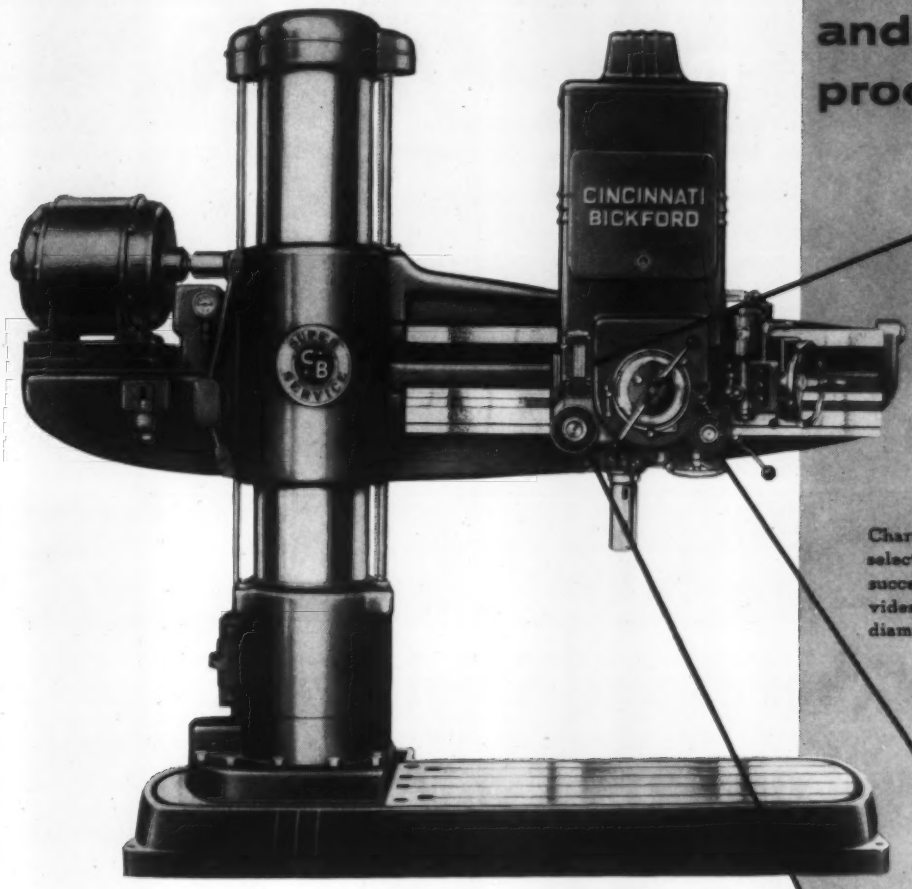
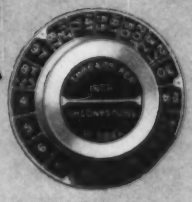
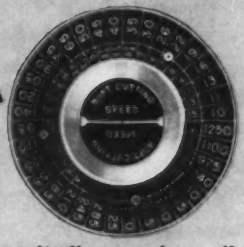


Chart guides the operator in pre-selecting speeds and feeds for succeeding operations. It provides a permanent record of tool diameter, speed and feed.



Hydraulically pre-selects all 18 feeds. Positive geared tap leads and feeds are quickly pre-set.



Hydraulically pre-selects all 36 speeds. Speeds and tool diameters are shown in large easy to read figures.

This NEW modern head gives an accelerated production and an increase in accuracy of performance ... the greatest advance in simple and positive control in Radial Drill history.

Two convenient direct reading dials control the automatic shifting of sliding gears. While the tool is cutting, merely set the dials to the speed and feed for the next operation. As the spindle is stopping for inserting the next tool, the shifting is done hydraulically ... directly, quietly and quickly. No other operations—no loss of time. Write for catalogs.

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CINCINNATI BICKFORD DIVISION

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GIDDINGS & LEWIS MACHINE TOOL CO. : Fond Du Lac, Wisconsin.

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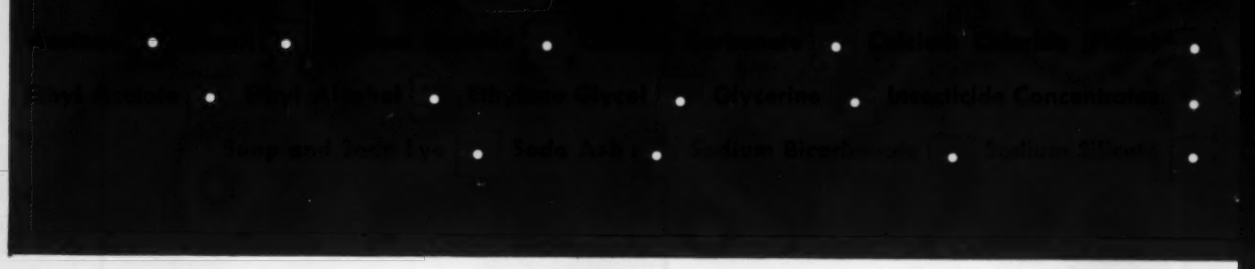


CF&I LECTRO-CLAD® Nickel Plated Steel Plates will give it to you

Yes, you can get low-cost, yet effective protection against contamination and corrosion with all these chemicals...and many more!

Effective in heavy industrial applications where the corrosion rate does not exceed 0.0015 inches per year, CF&I LECTRO-CLAD Nickel Plated Steel Plates successfully combine the corrosion and contamination resistance of nickel and the economy and strength of carbon steel.

That's because CF&I LECTRO-CLAD is made by the Bart Process, which consists of electrodepositing a heavy layer of 99% pure nickel on a carbon steel plate. This process results in a permanent bond between the nickel and the steel base. The nickel plating is customarily supplied in the 8-10 mil range; however, it can be plated up to 15-20 mils, if specified.

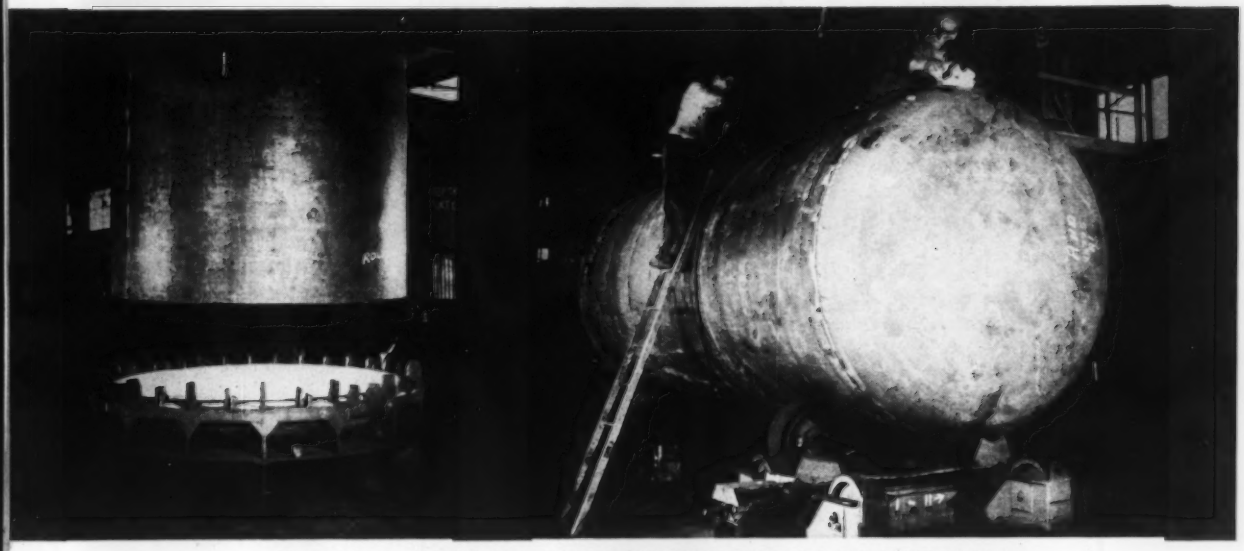
What's more, CF&I LECTRO-CLAD Nickel Plated Steel Plates are easily fabricated without costly special equipment. Just use regular shop equipment and bend it... weld it... roll it—the protective nickel layer will not check, spall or flake!

Ask our nearest sales office for the complete story on economical, effective, easy-to-fabricate CF&I LECTRO-CLAD Nickel Plated Steel Plate* today. Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P. O. Box 1951, Wilmington, Delaware.

*CF&I LECTRO-CLAD Nickel Plated Steel Sheets, Pipe, Fittings and Heads are also available.

protection against with these chemicals?

Caustic Soda • Chlorinated Hydrocarbons • Cold Hydrofluoric Acid • Dibutyl Phthalate
Methyl Alcohol • Petroleum Catalysts • Phenol • Potash • Resin Plasticizers • Salt
Sodium Sulphate • Titanium Dioxides • Tricresyl Phosphate



Assembling a tank fabricated from CF&I LECTRO-CLAD Nickel Plated Steel Plates.
The heads have also been nickel electroplated by the Bart Process.

3798

Claymont Steel Products

CF&I

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation

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ACME STEEL STRAPPING helped eliminate slow, costly manual handling of zinc slabs at The Anaconda Company, Anaconda, Montana. Each day over 700,000 pounds of zinc are unitized by stacking and strapping and then loaded in freight cars by lift truck. And it's done in ⅓ the time of former hand loading. (Idea No. U6-3)

Anaconda's customers are also sold on unitizing. Unloading is fast. Inventory is simplified. Storage space is used more efficiently.

***Check YOUR Acme Idea Man today.** He will show you examples of many similar Ideas-In-Action. He can use his experience to adapt these ideas to your needs. Write to Dept. GH-36, Acme Steel Products Division, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Ill. In Canada, Toronto, Ont.

ACME STEEL STRAPPING

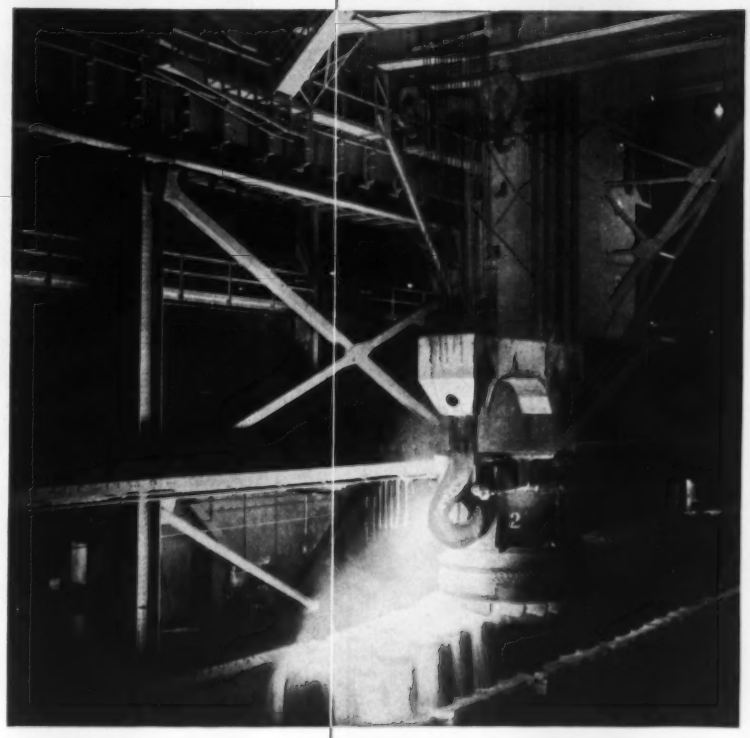
ACME STEEL

Morgan cranes stop "on a dime"

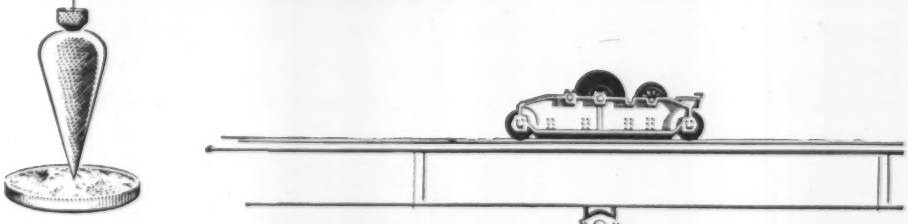
● BRAKING a Morgan crane under full load is as easy as stopping the family car.

Morgan hydraulic crane brakes provide maximum safety and pin-point accuracy in spotting heavy loads . . . another vital link in the chain of features that makes Morgan cranes best in the business.

Performance records prove that advanced design and heavy-duty construction of Morgan cranes make them less costly to operate and maintain. Let our representative show you how to save the most by buying the best . . . Morgan!



Positive action encourages operators to use the hydraulic brake rather than plug the motor.



The Morgan Engineering Company, founded in 1868, manufactures overhead electric traveling cranes, gantry cranes, charging machines, plate mills, blooming mills, structural mills, shears, saws, and auxiliary equipment.

THE MORGAN ENGINEERING CO. *Alliance, Ohio*

Expensive parts machined to close tolerances are always in danger of being scratched by jagged chips hiding in the weave of ordinary wiping material. Parts so damaged have to be reworked . . . sometimes scrapped entirely.

This wiping job could cost $50

They're easy to distribute . . .

They really soak up oil . . .

Always a clean one handy . . .

Just toss 'em in the trash . . .

When you use Scott Wipers, chips don't come back to scar man and metal . . . there's always a clean new wiper handy. You use one thoroughly and throw it away. No more expensive collection, sorting, laundering and distribution.

. . . this one cost less than ½¢

The Difference is . . . Scott Wipers

Strong, highly absorbent Scott Wipers can be used and reused. Yet they cost so little you can throw them away after a single use when the job calls for a clean wiper, free of chips and abrasive material.

Scott Wipers are reducing the cost of wiping in many companies. Sorting and baling are eliminated. Handling and distribution are simplified. Laundering becomes a thing of the past.

This is sanitary wiping. A man uses a Scott Wiper thoroughly, throws it away—takes a new one. No danger of cuts from hidden chips . . . no fear of skin infection from dirty wipers.

Put the Scott Wiper through its paces on your production line. Your local Scott representative or distributor is ready to demonstrate any time you say. Call today or mail this coupon.

SCOTT PAPER COMPANY
Dept. W-1, Chester, Pa.
Please send me more information about Scott Wipers.

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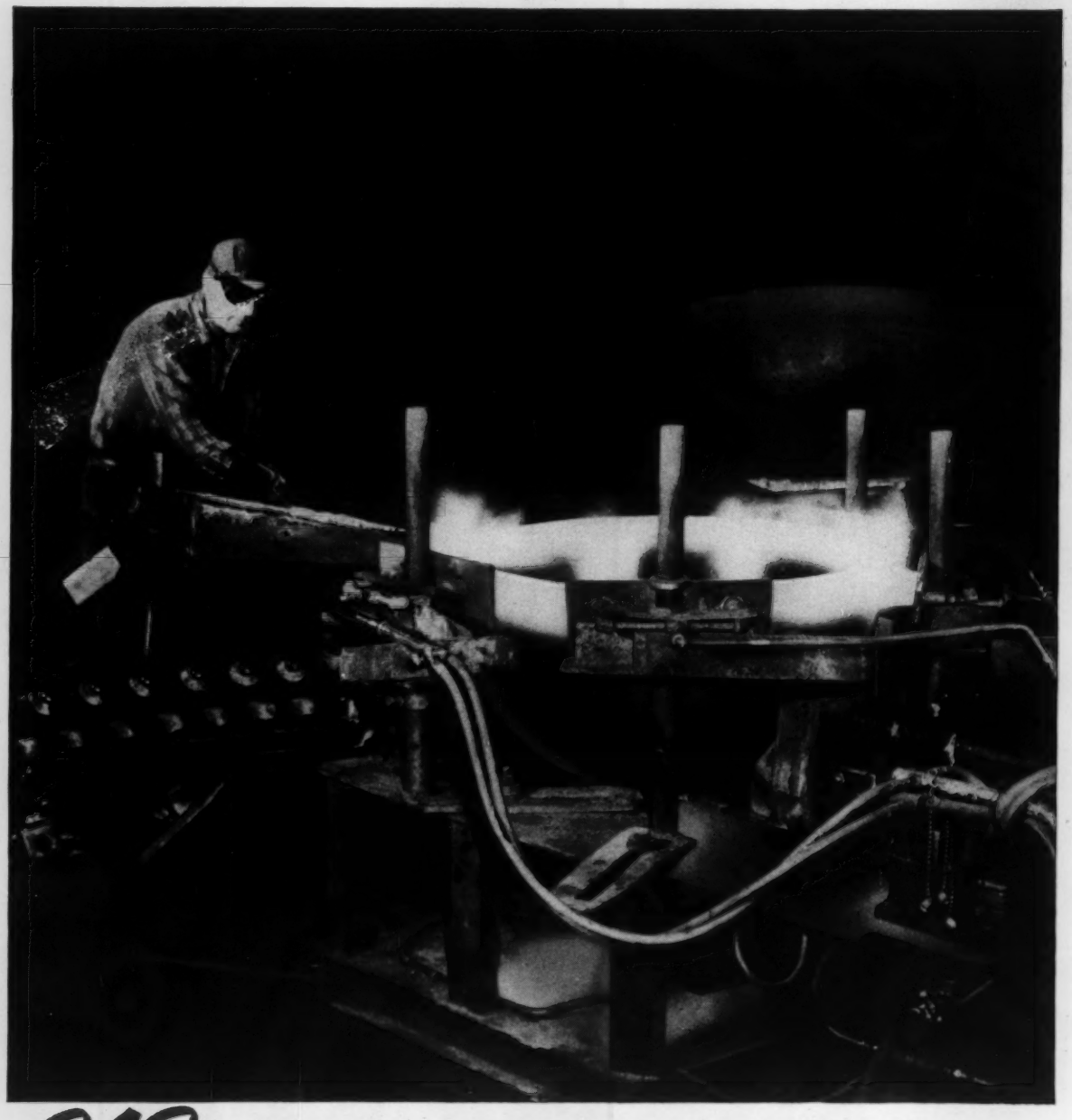


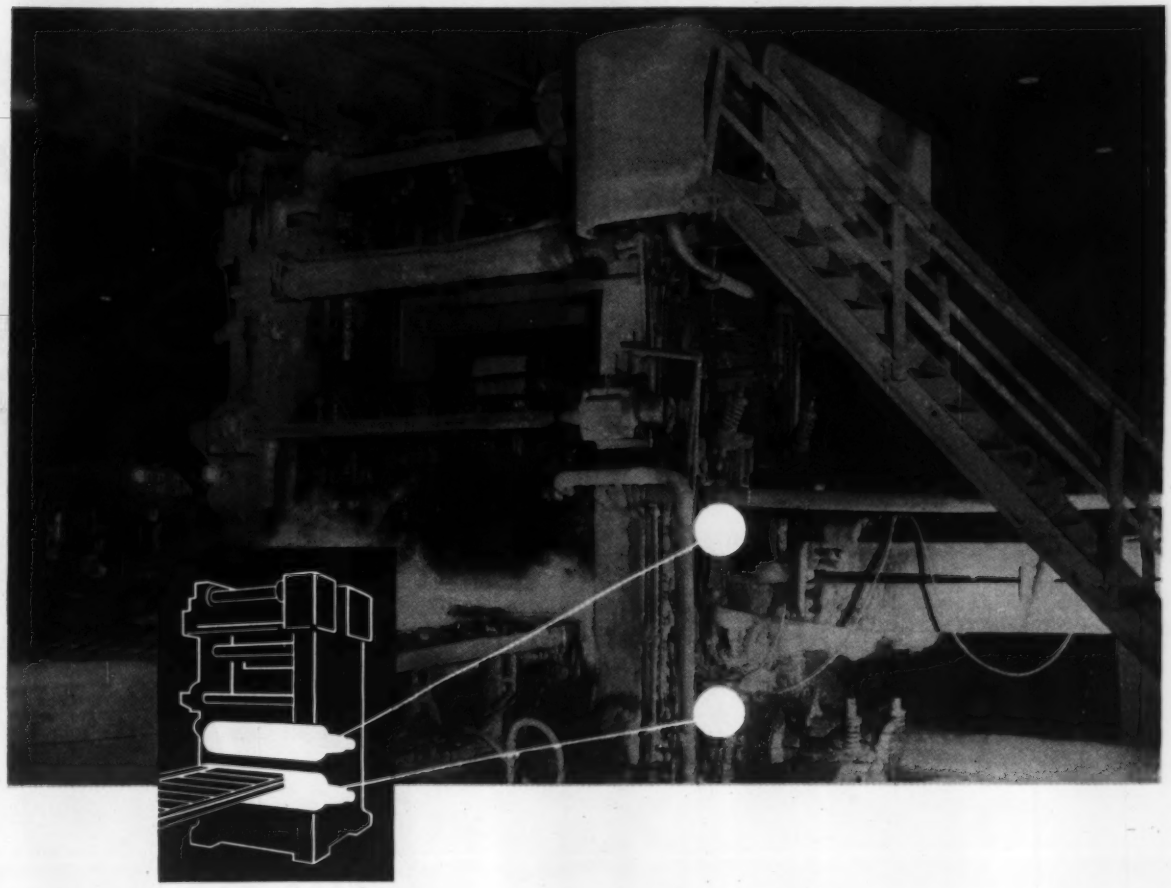
GAS gives new strength to tank heads at Lukens Steel Company

Lukens Steel Company, Coatesville, Pennsylvania, makes a complete line of heads for high pressure LP-Gas storage tanks. For economy reasons, these heads are cold pressed. But cold pressing leaves brittle areas on the head rim. When heads go through the "bumps" and "bangs" of tank assembly, breaks occasionally develop in the brittle area around the head rim.

Lukens solved the problem by stress relieving the heads with Gas. An assembly line conveyor brings the heads to a special Gas-fired machine where a battery of burners stress relieves the entire periphery of the ¼ inch thick head rim. As a result, there are no more brittle areas in the rim. And there are no more breaks during assembly operations.

When you have a problem in your production line involving heat processing, call your Gas Company Industrial Specialist. He'll be glad to discuss the economies and results you can expect from using Gas and modern Gas-fired equipment. *American Gas Association.*

Lubricating roll necks is no easy job



Lubricating the roll necks of a steel mill calls for a lubricant that will resist high temperatures. The lubricant must also function in the presence of steam, water, mill scale and other abrasive materials. It has to cushion great shock loads and cling tenaciously to the bearings it protects. It must last a long time... and it must be economical in use.

Atlantic Lubricant 10 performs exceptionally well in this service. It is being used in a pressure system on the mill illustrated, at the Lukens Steel Company in Coatesville, Pa., for the lubrication of roll neck bearings, pinion and spindle bearings.

Selecting the correct lubricant for the job is simplified when you call in your Atlantic Lubrication Engineer. He is a man with years of on-the-job knowledge of heavy industrial lubrication requirements of all kinds.

Why not see for yourself the value of Atlantic service? Just write, wire or phone the office nearest you for full information. The Atlantic Refining Company, Dept. M-7, 260 South Broad Street, Philadelphia 1, Pa.

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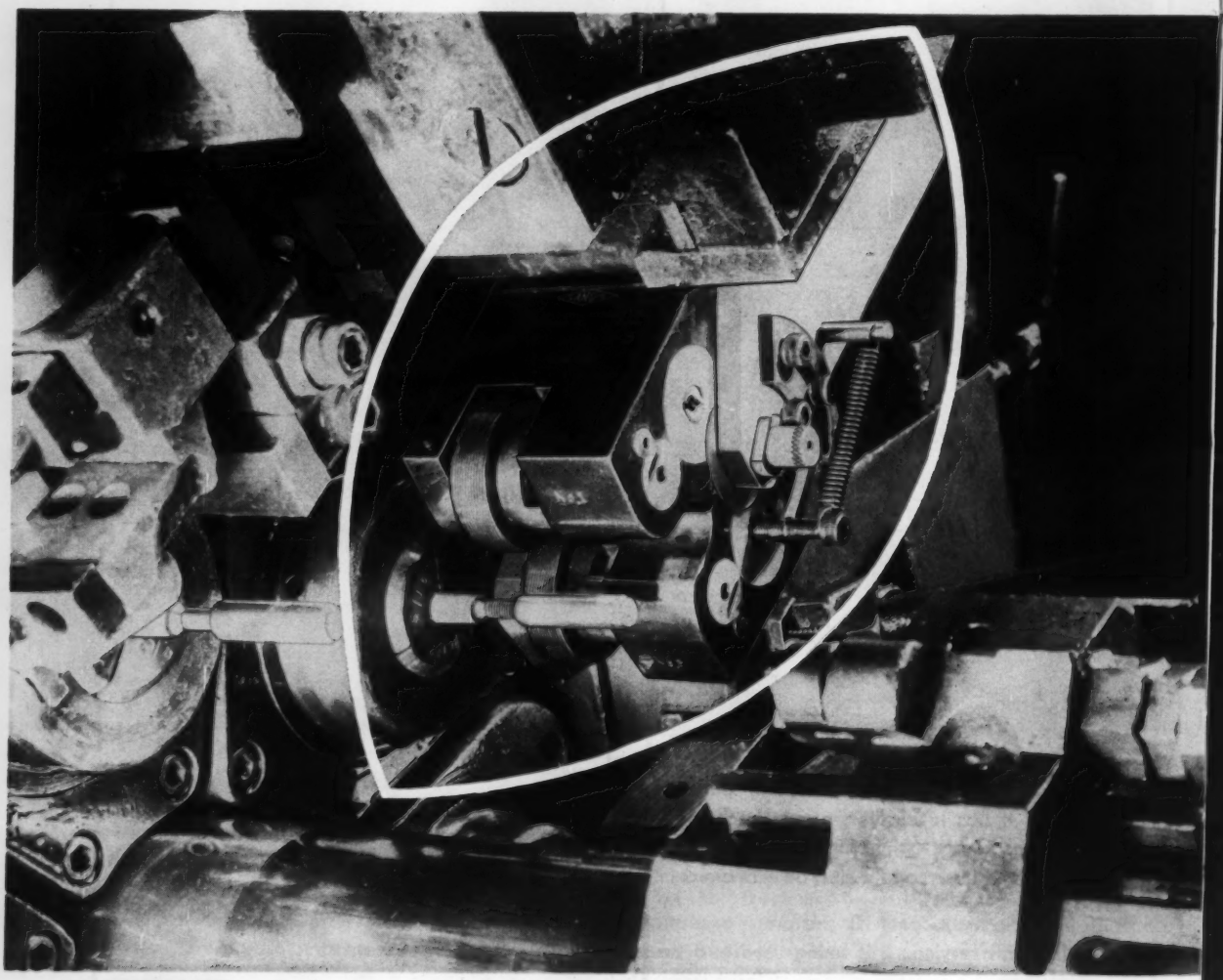
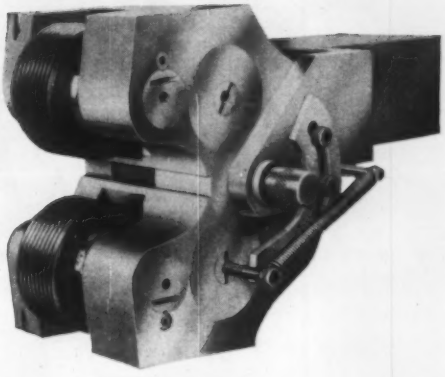
Over 1,100,000 threads



THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT | CUTTING - TAPPING - GRINDING - ROLLING

with 1 set of Rolls



The economy of LANDIS Thread Rolling Attachments due to long roll life is being demonstrated in the production of studs at the M & S Morenci Corporation in Morenci, Michigan.

#10-32 pitch NF threads, .350" long, are rolled on 1020 screw stock using a #14 GA LANROLL Attachment on a 9/16" Acme-Gridley Automatic. The Attachment is operated in the 4th position, rolling next to the collet .030" back of the shoulder, and threads are held to ±.00025" on the pitch diameter. 1,100,000 threads have been produced to date with the original set of roll dies. Another Lanroll Attachment later placed in operation on the same job has to date produced 500,000 threads with its original rolls.

This long roll life is a result of the basic design of the Lanroll Attachment incorporating patented new principles. A degree of stabilization never before obtained in a tool of this type is ensured between the workpiece and the attachment. Open construction allows the use of thread rolls of the maximum diameter, distributing wear over an increased area. The accuracy and wear-resistance of the rolls themselves is the result of more than 50 years experience in the manufacture of threading tools. These rolls are precision-ground to produce uniform, accurate threads of the highest quality.

LANROLL Attachments are made in five sizes for use on bar automatics and turret lathes to roll both fine and coarse pitch threads to Class 4 tolerances. Quick and easy set-up changes assure operation of the attachment for every size within its range as though it were exclusively engineered for the particular work being threaded. The M & S operation shown here is an example of this set-up simplicity. Using only the handbook furnished with the Attachment, a satisfactory production set-up was made by a set-up man with no previous thread-rolling experience.

For more detailed information on construction and many exclusive features, send specifications and ask for Bulletin G-96.

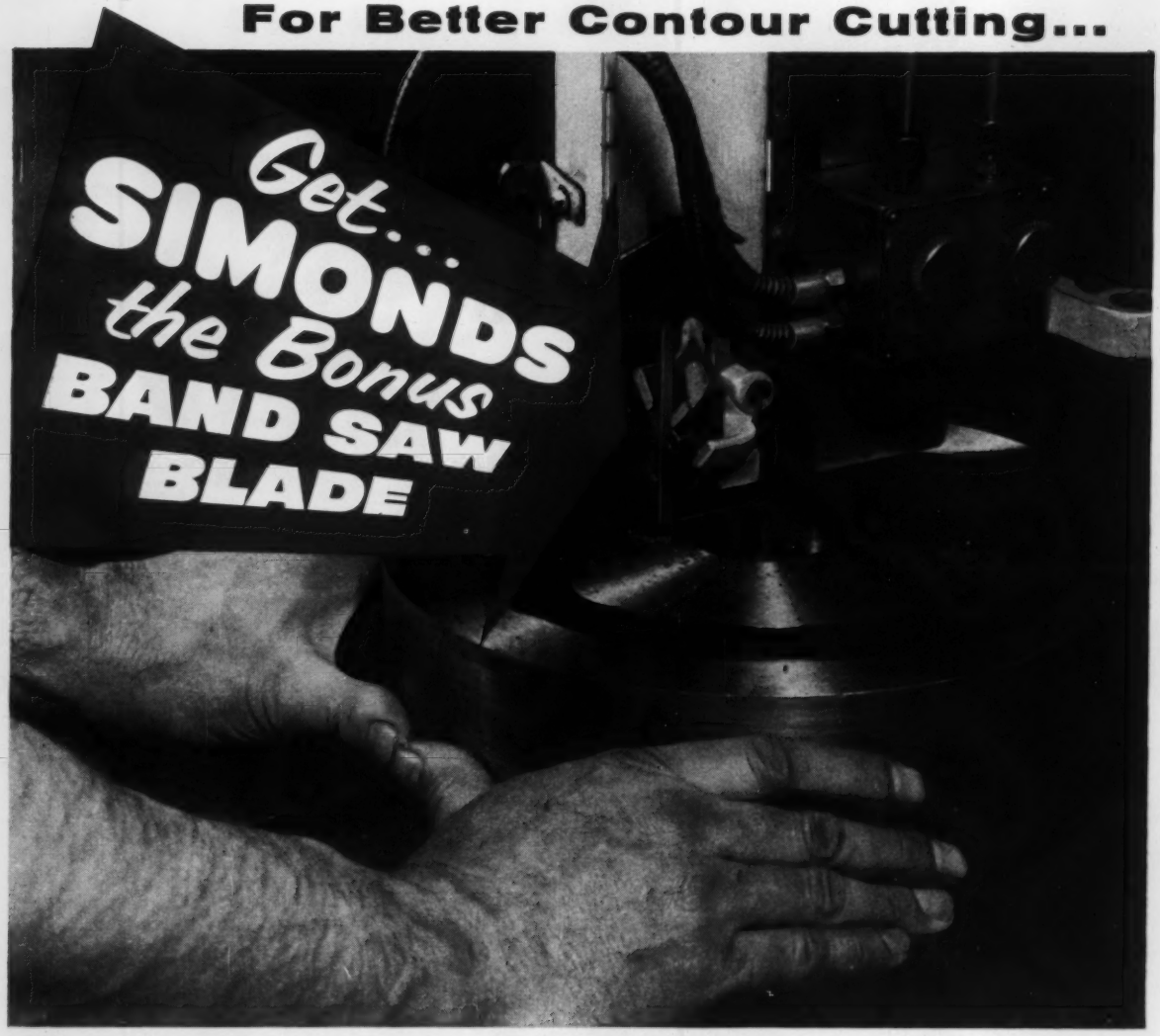
These THREADING TOOLS displayed at Booth 578 ASTE Show

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA • U. S. A.

450C

For Better Contour Cutting...



gives you more cuts, longer life, lower costs!

Here's a tough, edge-holding metal cutting band saw blade that gives you a real bonus in smooth, fast cutting and long life.

Made of extra tough, wear-resistant alloy steel, Simonds "Bonus" Bands have sharp, perfectly formed teeth — set with absolute evenness on both sides of the blade. Hardened along the tooth edge only by controlled heat treatment, they combine maximum cut-ability with flexibility and resistance to breakage, provide the ultimate in trouble-free service.

All standard widths and tooth spacings are furnished in 100′ and 250′ coils or welded to specified length. Ask your local Simonds Industrial Supply Distributor for more information on the complete line of Simonds "Bonus" Band Saws.

For Fast Service from Complete Stocks

Call your **SIMONDS Industrial Supply DISTRIBUTOR**

SIMONDS SAW AND STEEL CO.
FITCHBURG, MASS.

Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon
Canadian Factory in Montreal, Que., Simonds Divisions: Simonds Steel Mill, Lockport, N. Y.
Heller Tool Co., Newcomerstown, Ohio
Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

(Advertisement)

Pumping Progress Report

FOR MECHANICAL ENGINEERS

An advertisement prepared by the Aldrich Pump Co., Member of Hydraulic Institute, U.S.A.

PUMP INSPECTION, MAINTENANCE AND REPAIR are jobs too frequently ignored in the design of production pumps. This has been verified by a survey of more than 15,000 pump installations. Speed and economy of maintenance was frequently quoted as a major factor in pump selection.

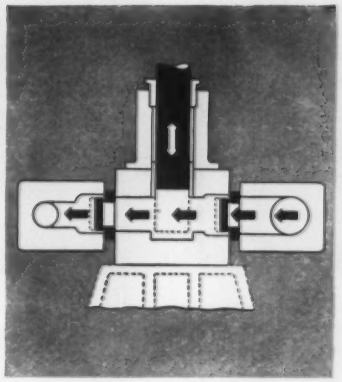
SECTIONALIZED FLUID-ENDS offer one of the best ways to guarantee both speed and economy in pump maintenance. As originated by ALDRICH Pump Co. Engineers, the Sectionalized Fluid-End comprises four main assemblies — the working barrel, suction manifold, discharge manifold and stuffing box.

SPEED IN MAINTENANCE is assured because of ease of accessibility of all wearing parts. Manifolds can be slid back on studs and valves removed as complete units. Split collar and flange connection of plunger to yoke permits easy removal of plunger.

ECONOMY OF MAINTENANCE results from speed in maintenance. Perhaps even more important is the simple fact that it is cheaper to replace a single section than a complete fluid-end. Another important economy is parts interchangeability. Among 3-, 5-, 7- and 9-plunger units of any series, wearing parts are interchangeable. Where a combination of multiplex pumps is required, this reduces spare parts stocks.

THE ALDRICH PUMP COMPANY is the originator of the DIRECT FLOW principle — a design innovation that utilizes the sectionalized fluid-end principle. Aldrich Engineers have become known as the people to take your tough pumping problems to. We have never turned down a challenge.

FURTHER INFORMATION can be had direct from the company. Tell us your problem and we'll send you Data Sheets describing the size pump we recommend to solve your problem. Address your request to: The Aldrich Pump Company, 18 Pine Street, Allentown, Pa.



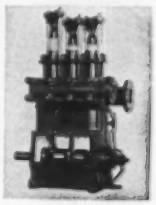
Aldrich Direct Flow Fluid-End Design

...for your tough pumping problems specify ALDRICH

The Direct Flow principle, an Aldrich design innovation, is a major forward step toward the solution of tough pumping problems of all kinds. Not only does it eliminate two right-angle turns in the fluid-end, but in addition makes possible complete Fluid-End Sectionalization. This is another Aldrich design innovation which permits economies of maintenance and repair offered by no other type pump.

CHECK THESE ADVANTAGES OF SECTIONALIZED FLUID-ENDS:

Less expensive parts replacement
Ease of inspection and maintenance
Interchangeable wearing parts
No special equipment for valve removal
Easily accessible stuffing boxes



Write today for Data Sheets describing the Direct Flow Pump Series.

THE ALDRICH PUMP COMPANY

Originators of the Direct Flow Pump
18 PINE STREET
ALLENTOWN, PA.

Representatives in principal cities

PUSH-BUTTON ECONOMY

Yesterday, Jones & Lamson broke through the speed barrier with high-velocity metal turning.

Today, advanced engineering at Jones & Lamson again pioneers in attacking a critical cost consideration: the *man-hour* factor.

Here are a few of the engineering innovations which are strategically important for (1) minimizing operator fatigue and human error (2) speedy change-over and retooling, and (3) push-button simplicity of operation:

In Turret Lathes: Geneva saddles and Hydra-Clutch headstocks; automatic thread chasing; one- or two-way tracing combined with normal Turret Lathe operation; Numerical Tape Control for Automatic Turret Lathe.

In Automatic Lathes: Automatic handling; feed-back; gaging; sorting; chip disposal.

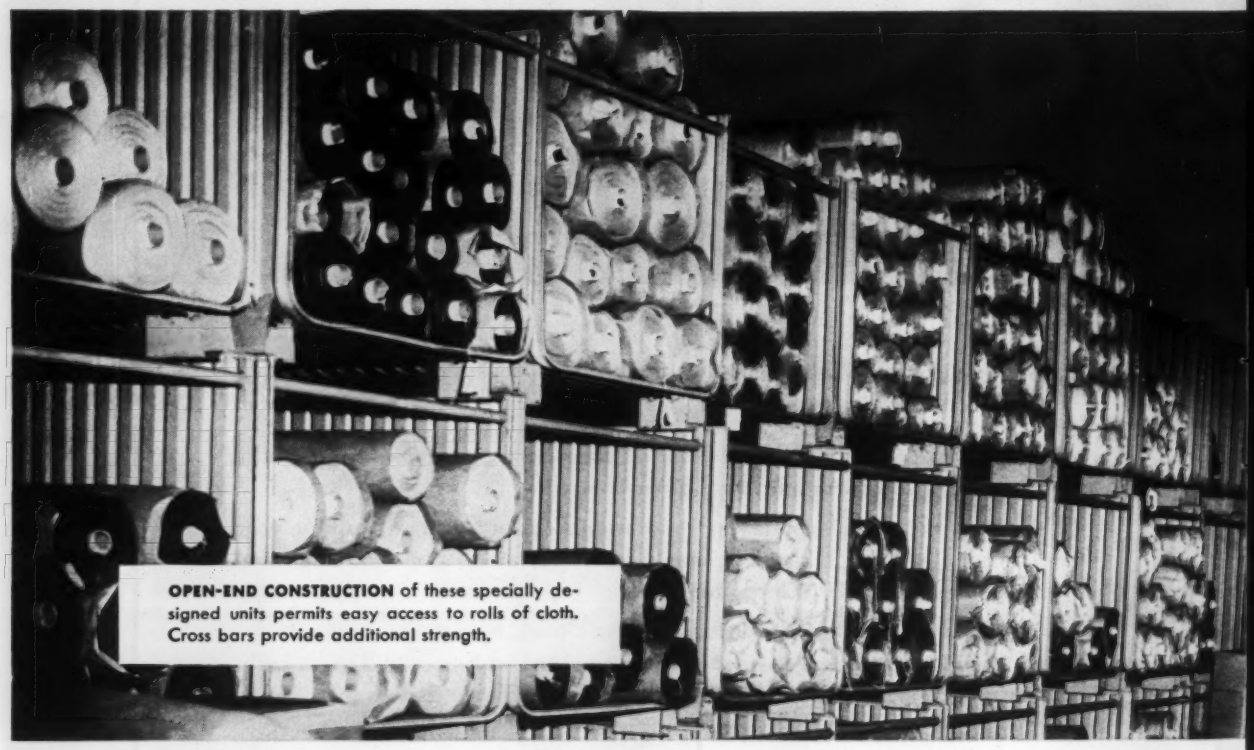
In Grinders: Automatic Tap Grinders; Optical Contour Grinders; automatic handling for Thread and Form Grinders.

These are typical results of our all-out efforts toward machine design that will reduce costs, increase production, and keep both operators and management happy.

The man who needs a new machine tool is already paying for it.

JONES & LAMSON MACHINE CO • 517 CLINTON ST • SPRINGFIELD, VT.

Turret Lathes *Fay Automatic Lathes* *Milling & Centering Machines* *Thread & Form Grinders* *Optical Comparators* *Threading Dies & Chasers*



OPEN-END CONSTRUCTION of these specially designed units permits easy access to rolls of cloth. Cross bars provide additional strength.

This Special Republic Equipment A HANDLING PROBLEM and

Here's another example of how the experience, designing ability and fabricating versatility of Republic's Pressed Steel Division paid off in a simplified handling system that reduced costs.

United Piece Dye Works, Inc., of Lodi, New Jersey, had a difficult problem involving the handling, transporting and storing of large-diameter bolts of cloth.

United received the cloth "in the gray" as it came from the looms. After dyeing, bleaching or printing, the rolls of finished goods were stored in bins in the company warehouse and were parceled out in varying amounts as customers requested them. Each request required numerous and costly handling operations.

Republic Materials Handling Engineers, called in to work on the problem with United Engineers, developed the special units shown above. Now, instead of handling only one bolt at a time, numerous bolts can be stored, handled and transported quickly and easily in each unit. The entire operation is greatly simplified and cost reduced. But, these are only initial benefits. Design and

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

FOUR-WAY ENTRY PERMITS EASY HANDLING of units in restricted spaces. Offset channels under units allow tiering to practical heights.

SIMPLIFIED CUT COSTS

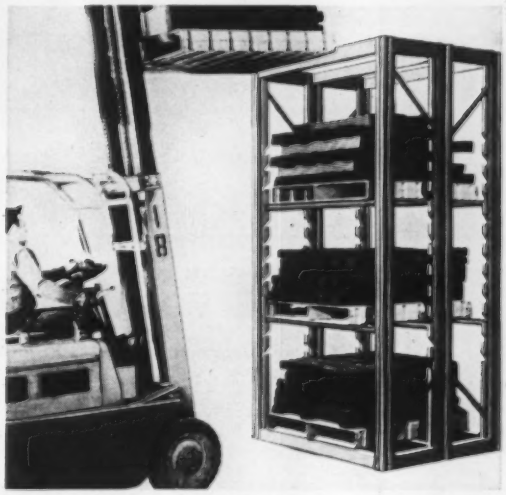
construction features of all Republic Materials Handling Equipment assure long service life at lowest per-year cost.

What about your plant? Perhaps a specially designed unit could cut your costs or simplify an operation. Republic engineers are available to help you design a unit to meet your specific needs. There's no obligation. Contact your Republic Materials Handling Equipment Dealer. Or write us. Visit our booth at the Material Handling Institute's Exposition, Cleveland, Ohio, June 5th thru June 8th.

STEEL

and Steel Products

REPUBLIC ALLOY STEEL CHAIN SLINGS SIMPLIFY HANDLING of heavy parts, machinery, etc., and at the same time provide an exceptionally high degree of safety. Republic Alloy Chain is more than twice as strong as low carbon chain of the same size. Republic's Bolt and Chain Division also makes chain slings in High Test Steel and Wrought Iron. They are supplied in any length and are proof tested and warranted to meet or exceed specifications.



REPUBLIC STEEL PALLET RACKS SIMPLIFY PALLETIZING and stacking of bulky, uneven, odd-lot and fragile materials. Tubular steel supports adjust every six inches to handle palletized material of any height. Two-way entry permits loading and unloading from either side. Select single pallets from any level without restacking. Write for complete description, specifications and quotations.

REPUBLIC STEEL CORPORATION
Dept. C-1375
3120 East 45th Street
Cleveland 27, Ohio

☐ I am interested in more information on Materials Handling Equipment.
☐ Have a Materials Handling Engineer call.
Send additional information on: ☐ Chain Slings ☐ Pallet Racks

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Protect your plant with the same Ansul extinguishers that guard this big steel mill

Well-planned safety and fire prevention programs are doing their share to protect lives, property and production schedules at the Great Lakes Corporation, Detroit, Mich., division of National Steel Corporation. Ansul fire extinguishers are playing a part in this successful program.

Your safety program deserves the best in fire protection. Remember, fire doesn't give you a second chance. Here are three big reasons why Ansul dry chemical extinguishers can take the worry out of your fire protection program and help you maintain a safety record to be proud of:

First. Ansul extinguishers are *dependable.* They are always ready for action, even under severe exposure conditions. Weather-tight construction assures this dependability. *Second.* Ansul extinguishers are *effective.* Patented nozzles deliver either a straight or fan stream, depending upon the hazard. This is an Ansul exclusive for more effective fire control. *Third.* Ansul extinguishers are backed by a *five-year warranty.* This is the best way we know of saying that Ansul extinguishers are the finest of their kind made anywhere. No other manufacturer offers this important warranty.

Get in touch with your local ANSUL MAN through the yellow pages of your phone directory, or write direct to ANSUL CHEMICAL COMPANY, DEPT. S-3, MARINETTE, WISCONSIN.

ANSUL

1105...YES, ELEVEN-O-FIVE

is the new-strength wire in Roebling's

Royal Blue

WIRE 1105 ROPE

AS SIZES and constructions go, Royal Blue is like the ropes you have used until now... but the likeness ends there.

Royal Blue is made of Roebling's new 1105 wire, the strongest, toughest wire developed up to now for use in any wire rope.

Royal Blue Wire Rope is as enduring as the wire from which it is made.

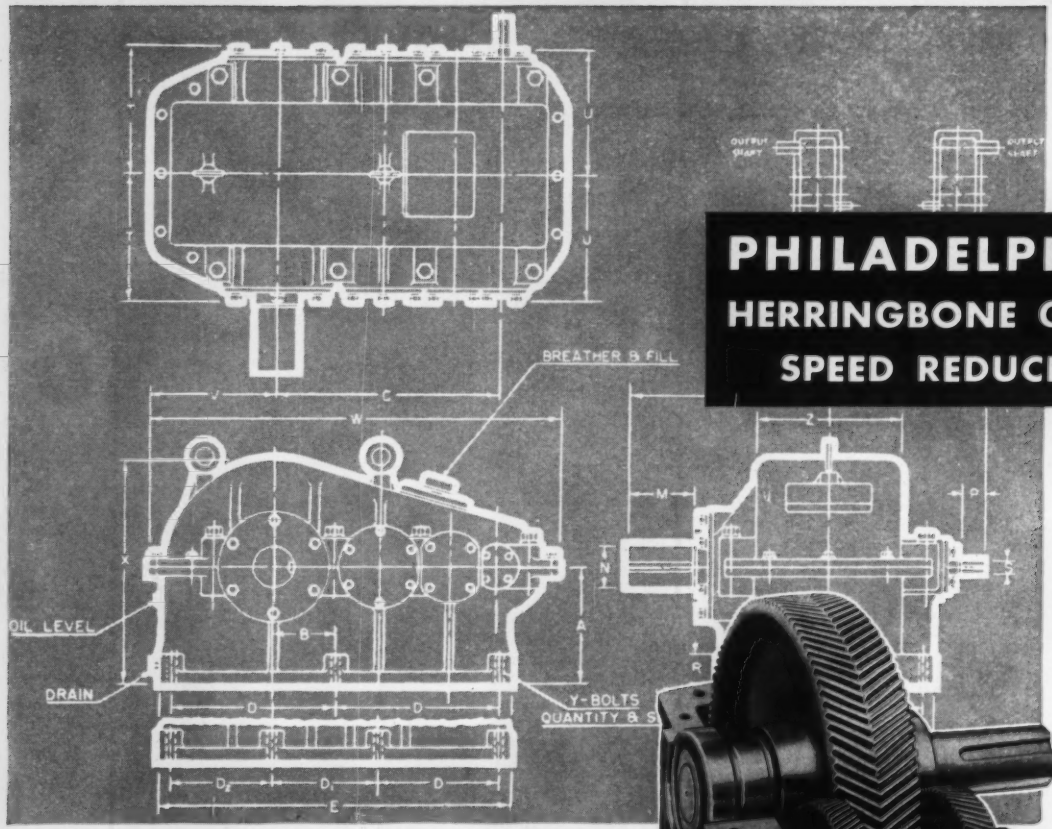
Write us for full facts on Royal Blue Wire Rope, or contact your Roebling distributor.

ROEBLING

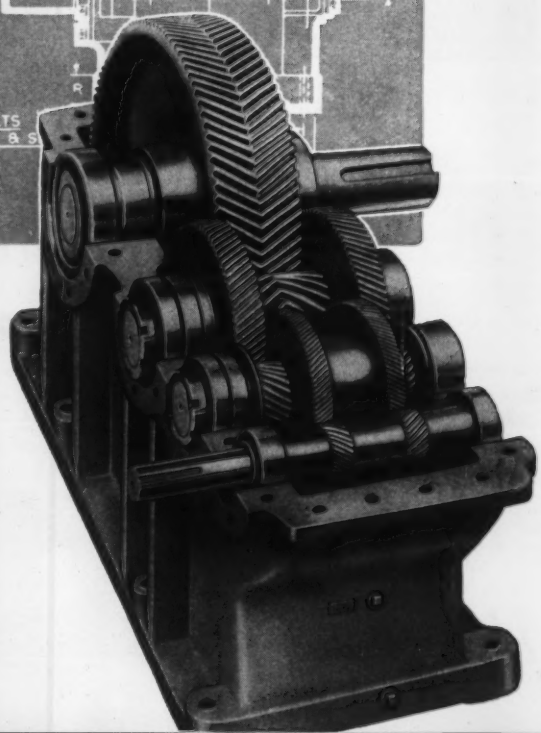
Subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1930 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

Here's the Reducer with a BACKBONE . . . . and a BACKGROUND



PHILADELPHIA HERRINGBONE GEAR SPEED REDUCER

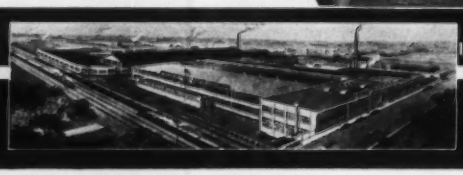


Yes, Philadelphia Herringbone Reducers can truthfully be said to be *Reducers with a "backbone" and a "background,"* because we have not only been making industrial speed reducers since their inception—but we were one of the pioneers in applying the Sykes continuous tooth type gear to speed reducers.

If you have a problem involving high horsepower speed reduction with heavy shock loads, Philadelphia Herringbone Reducers are the answer. These quality-built units are available in Single, Double and Triple Reduction Types, offering a wide selection of capacities and reduction ratios. The continuous tooth type herringbone gears assure evenly distributed pressure over each tooth from the top to the working depth line—which means exceptionally long life, minimum vibration, quiet operation and maximum transmission of power . . . Thousands of Philadelphia Herringbone Reducers are in daily use, in most every line of industry. Be convinced, send for Catalog H-55.

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. & G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
BALTIMORE • CLEVELAND
Virginia Gear & Machine Corp. • Lynchburg, Va.



Industrial Gears & Speed Reducers

LimiTorque Valve Controls

Established 1892

"..and this, Rangers is my dad's brand new 10,000-lb. double frame hammer complete with redesigned valves, larger port openings through valves, and streamlined steam passages!"

Pretty impressive stuff to a kid! But chances are your plant won't let the small fry near enough to even sneak a look at those big steam hammers. So here at Erie we've decided to give the kids a break. We've put out a book in their language—with pictures!—telling them all about forging from the crudest cave-man anvil and hammer to the latest hydraulic press. They'll learn a lot . . . and you . . . you'll be more a hero in their eyes than ever! Send now for your free copies of "Forgeland, U.S.A." Send, also, for descriptive technical booklets available on all Erie Hammers —Steam, Board Drop, Single Frame and Double Frame—yours for the asking—just write us.

ERIE

ERIE FOUNDRY CO. ERIE, PA.

"OUR 61st YEAR"

FORGING HAMMERS • TRIMMING PRESSES • HYDRAULIC PRESSES AND ALLIED EQUIPMENT

let your Youngsters learn about FORGING

If you have a raft of kids—send for a raft of books:

ERIE FOUNDRY CO., ERIE, PA.

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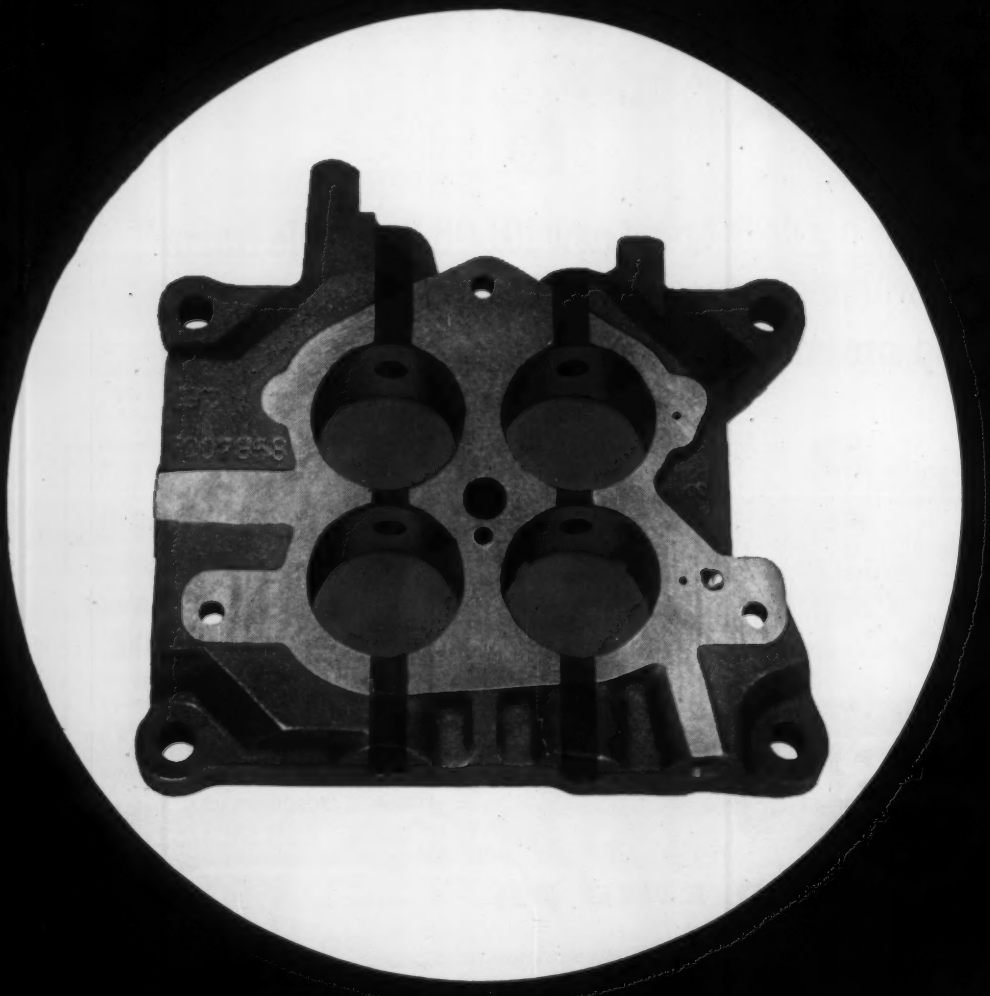
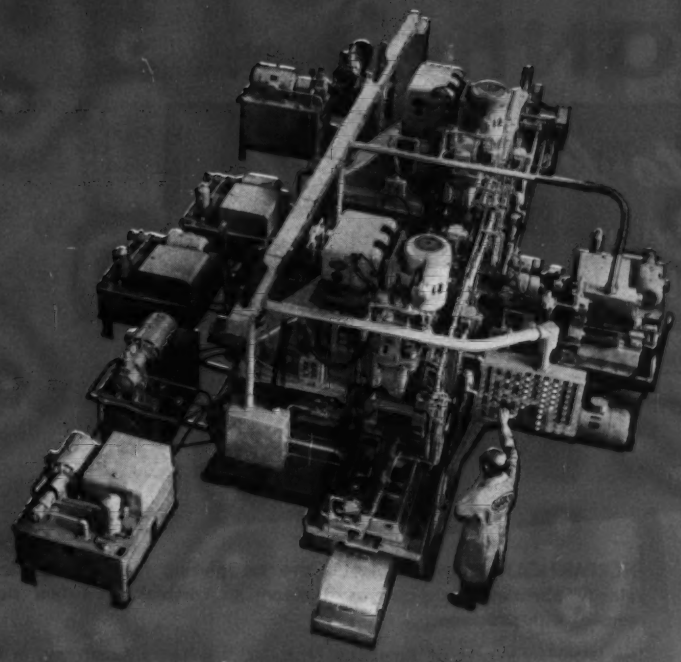
Here's Automatic Production On High-precision Parts





When is fast transfer production limited by precision requirements? This frontier is steadily being pushed back by Natco engineers in new Holeway processing machines.

Take this throttle body, for example. The large holes are reamed to *limits of .0015" for location, .0003" for size, 125 microinch* finish! Production—*600 parts per hour!*

Natco's high-speed gun-drilling heads give required finish in interrupted throttle-shaft holes without reaming. Size is held to within .001".

Many unusual problems are solved in locating, holding and positively controlling light-weight parts between stations at high transfer speed. Chip disposal is automatic; cutting oil is filtered for re-use.

Here's the sequence of operations. Combination rough and semi-finish ream four large holes. Gun drill two holes (two breakthroughs each). Finish ream four large holes.

Whenever fast, automatic production makes sense, don't let high-precision requirements stop you. A Natco engineer can tell you in a hurry whether it's feasible and how the job can be done.

National Automatic Tool Company, Inc.

Richmond, Indiana

Multiple-spindle drilling, boring, facing and tapping machines
Special machines for automatic production

NATCO

Notes from Natco...

Beating the Index Hex

Common design dilemma . . . heavy rotating tables and high-speed indexing just don't want to mix. Priding ourselves on being good mixers, we added a hydraulic decelerating device, giving us tables that index faster than ever and still stop on a gnat's eyelash.

Automatic Squirt

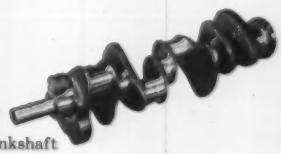
Universal joints universally demand frequent lubrication. Our adjustable joint-drive heads now include automatic lubrication. Once the timer's set, the oil will jet . . . at any time interval you select. One more thing the operator can forget about.

One Will Get You Four

Here's an investment return that makes Florida real estate look like shaky speculation. Sixteen months ago one of our customers bought a new Natco light sensitive multi-driller and tapper. Cost . . . under $5,000. To date they report direct labor savings of $20,000.

Processed by Natco Machines

Part: Front Axle Support
Machine: Natco 3-way horizontal
Operations: Drill 7 holes; Core drill 1 hole; Combination drill and chamfer 4 holes; Combination drill and spotface 1 hole; Tap 11 holes
Production: 16 per hour

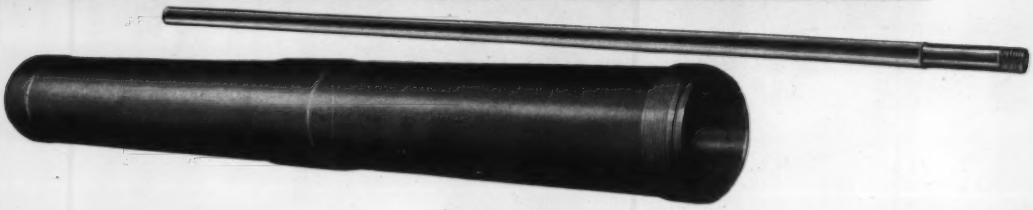


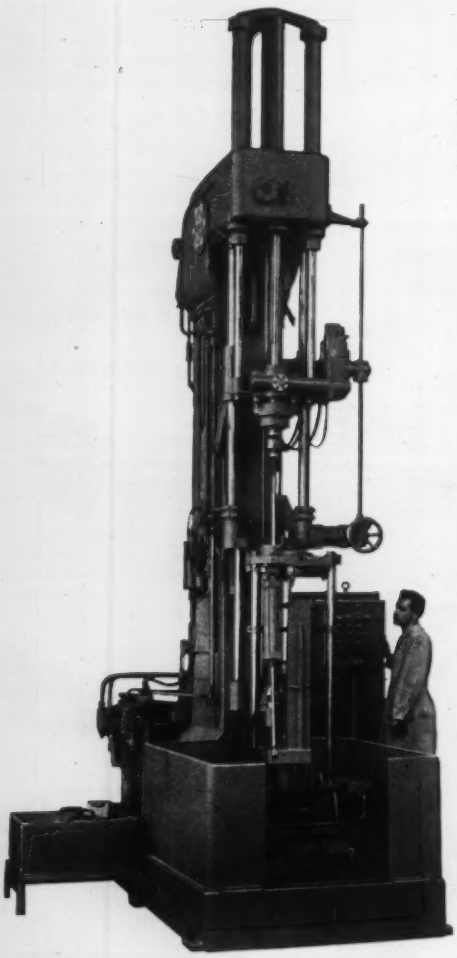
Part: Crankshaft
Machine: Natco trunnion type
Operations: Drill, face and tap 1 hole; Drill, chamfer and ream 6 holes; Drill, semi-finish and finish ream 1 hole; Drill and ream 1 hole; Tap 6 holes
Production: 42 per hour

Part: Steering knuckle
Machine: Natco trunnion type
Operations: Spotdrill 4 holes; Drill 5 holes; Spotface 5 holes; Ream 2 holes; Combination ream and counterbore 1 hole
Production: 250 per hour

MICROHONING*...

Efficient Stock Removal
with
LOW-VELOCITY ABRADING





INCREASINGLY, process engineers are recognizing Microhoning's low-velocity abrading technique as a means of combining efficient stock removal with precision.

The Brooklyn Works of American Machine & Foundry Company, in the precision-manufacture of recoil mechanisms for artillery weapons, required a process that would most efficiently remove substantial amounts of stock and generate functional surface characteristics on the I.D. of recoil cylinders and O.D. of piston rods. After extensive study of available methods, AMF selected Microhoning as the most productive and economical process for obtaining desired results.

The floating piston in the recoil cylinder has nitrogen gas on one side and hydraulic oil on the other. Because silver ring seals are used, any error in geometry or roughness of cylinder or rod surfaces will induce deformation or scoring of silver rings and break these important seals.

The largest cylinder processed by AMF to date is for a 75 mm gun and has a bore diameter of 4.750 inches and a length of 46 inches. Piston rods for this gun are 1.375 inches in diameter and 56 inches long. Both I.D. and O.D. operations are on the same Microhoning machine—Model 450 Hydrohoner.

The Microhoning process efficiently removes up to .026 inch of stock from cylinders and .006 inch from rods to correct waviness, taper and out-of-roundness. A geometric tolerance of .0001 inch is held while obtaining a 1.5 microinch finish.

Working closely with AMF manufacturing personnel, Micromatic developed fixtures and tooling that minimize changeover time. The fixture for the cylinder is mounted on an indexing table so it is simply indexed away from the spindle while the rod is being Microhoned. You, too, can solve your precision stock-removal problems through application of Microhoning—the low-velocity abrading process.

For further information write for CROSS-HATCH, Vol. 7 No. 5

***MICROHONING=**
Stock Removal + Geometry + Size Control + Surface Finish

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE • DETROIT 38, MICHIGAN

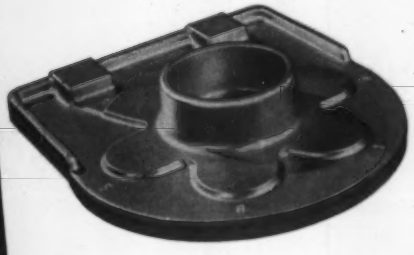
main valve seat for fire plug

Sand-cast pegs bent easily, causing improper fire plug operation. Full line pressure could not be maintained. Machining often uncovered blow-holes causing rejects. Switched to brass forging for higher strength, dense structure, closer tolerances, reduced over-all costs.

multi-port valve body

Porous sand-cast part caused non-detectable leaks in air and fluid system tests. Switch to fine-grained brass forging stopped trouble. Rejections, scrap, costs all reduced. Closer tolerances and better appearance achieved by using brass forging.

base for TV signal transmission



Porosity and blow-holes in sand-cast part caused "high standing wave," or loss of power feeding into TV transmitting tower through base on end of cable. This required tearing down whole assembly at considerable cost. Switch to dense, strong forging eliminated rejects and power leakage.

water meter lid and register box

Lid converted from sand casting to brass forging. Register box from sand casting to pressure die casting. Weight reduced greatly on both — thus lowering costs. Closer tolerances after change eliminated costly machining on the box.

Vital Change

from sand castings to brass forgings

Titan brass forgings are more easily drilled, tapped, broached and milled than are sand castings. Fewer machining rejects result. Forgings are hot-pressed quickly, are denser, tougher and stronger. Moreover, brass forgings have a smooth beauty and warmth not obtainable in sand castings. Scrap is reduced. Some machining operations necessary on sand castings are actually eliminated by switching to accurate-dimensioned forgings. Getting down to brass tacks, what this means to you is lower costs and a better product by switching to Titan hot-pressed brass forgings.

Send us a sample, drawing, and production quantities of sand-cast assembly parts you now use. We'll quote you on changing to brass forgings.

If you want more data on Titan brass forgings, send coupon below:

Dept. C
Titan Metal Manufacturing Co., Bellefonte, Pa.
Gentlemen:

- ☐ Will send sand-cast part and details for you to quote as brass forging
- ☐ Please send further data on Titan brass forgings
- ☐ Have Titan representative call

Name_____ Title_____

Company_____

Address_____ City & State_____

Titan

METAL MANUFACTURING COMPANY

Bellefonte, Pa. Offices and Agencies in Principal Cities

Quality Alloys by Brass Specialists

ÆSOP'S FABLES No. I

Foxy Fox was quite hungry and thirsty when he stole into a vineyard with its luscious grapes hanging high on a trellis. Again and again he jumped and snapped, only to fall short each time. Finally, fatigued, he sat back on his haunches and muttered: "Well, I didn't want those grapes anyhow . . . they're probably sour!"

Moral:

It is easy enough to say "sour grapes" to that which we cannot get.

. . . but, there's no cause for this to happen when it comes to the *availability* of famous ADAMANT High Temperature Fire Brick Cement . . . or any others of the popular ADAPRODUCTS Line of Refractories. We have Distributors located in key spots throughout the country . . . in Canada, too! Consult the yellow pages of your 'phone directory . . . or, write us for the name and address of your nearest BOTFIELD Distributor.

ESTABLISHED 1907

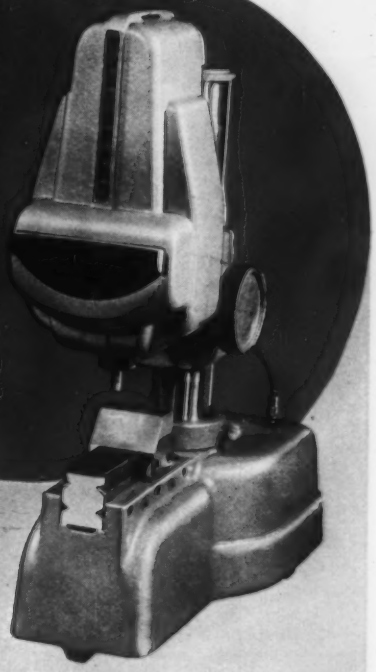
Botfield

REFRACTORIES

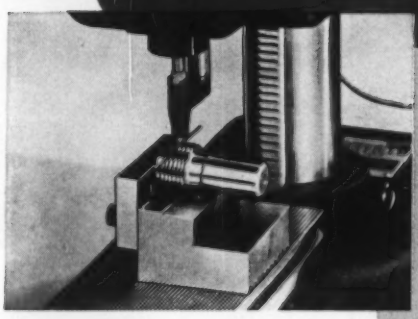
ADAMANT and other ADA products

swanson and clymer sts.
philadelphia 47, penna.

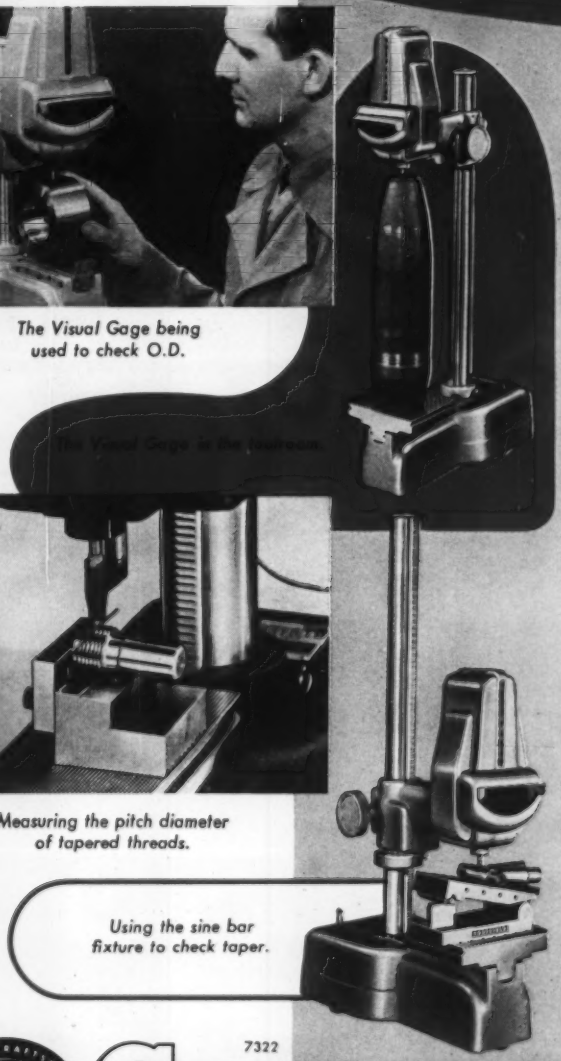
Use a SHEFFIELD VISUAL GAGE FOR 10 DAYS ... FREE



The Visual Gage being used to check O.D.



Measuring the pitch diameter of tapered threads.



Using the sine bar fixture to check taper.

Prove to yourself the real value of the Visual Gage right there in your own shop. You won't be obligated in any way.

See how simple it is—how fast—how sensitive—how positive—how rugged—and how easy to read.

See how many ways you can apply it to the precision work you are doing in the toolroom and in the shop.

The Visual Gage will with suitable accessories readily check angularity and any outside dimension including screw thread characteristics.

If you are working to "Tenths", ask for a Visual Gage having an amplification of 1000 to 1. If your tolerances are as small as ten millionths, ask for an amplification of 10,000 to 1. You have a choice of 5 amplifications.

7322

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manufacture and measurement for mankind

GOLDEN ANNIVERSARY — MASTER CRAFTSMAN HEADQUARTERS

THE SHEFFIELD CORPORATION
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Without obligation, we'd like to try a VISUAL GAGE in our shop.

Name_____

Dept._____ Position_____

Company_____

St. Address_____

City_____ Zone____ State_____

Introducing new ROTARY

streamlined TORRINGTON SWAGING MACHINES

featuring...

- **maximum capacity for size and power**
- **convenient location of controls**
- **easy access for maintenance**
- **integral storage space**
- **modern styling and color**

Styled in keeping with the dynamics of industry today, each new Torrington Swaging Machine embodies many engineering and design improvements.

Over-all dimensions of dies, backers, rolls and flywheel have been carefully engineered to provide the greatest swaging capacity possible for given machine size and horsepower. Moving parts are made of the finest grade tool steels, hardened and finished by the most advanced methods. Special grade Krupp steel materially improves life of inside rings.

Controls, gatehandle and flywheel guard opening are located on the left side of each machine for easy, natural operation. The new base design allows ready access to power and drive mechanism for easy maintenance.

Scientifically styled to eliminate the distraction of moving parts, the machines also embody improvements that subdue noise.

Whether you are pointing, tapering, reducing or shaping rod or tube, do it the *modern* way by swaging... on a *streamlined* Torrington Rotary Swaging Machine. For complete details, please write.

THE TORRINGTON COMPANY

Swaging Machine Division

150 North Street, Torrington, Conn.

See the new streamlined
TORRINGTON ROTARY SWAGING MACHINES
at Booth 219, ASTE Exposition in Chicago, March 19 to 23.

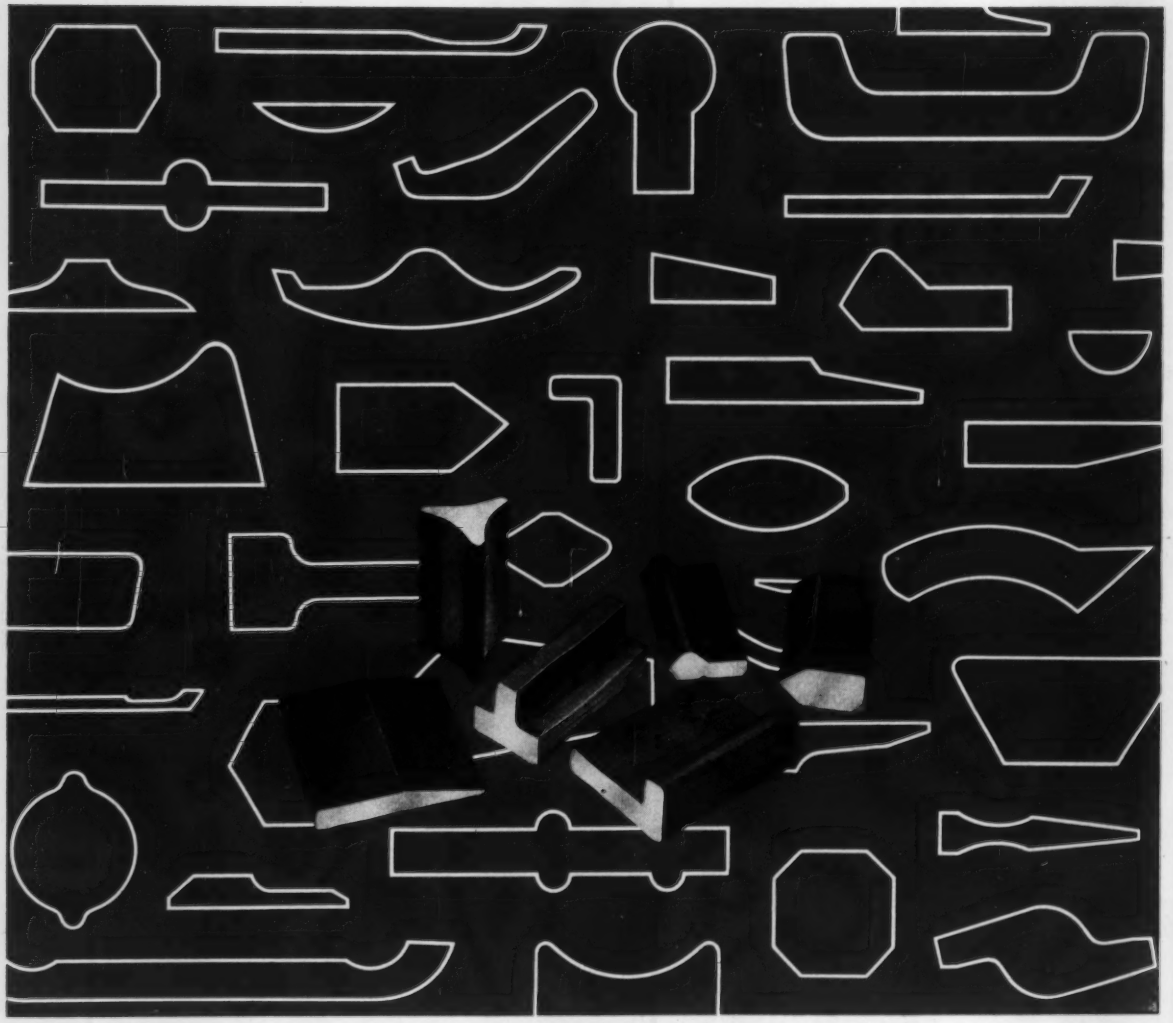
Model Number	Work Diameter Solid*	Tube
100	1/16	1/4
111	1/8	5/16
211	3/16	1/2
312	3/8	7/8
423	5/8	1½
1023	1	1½
434	**	2½
436	**	2½
438	**	2½

Three light-duty Swaging Machines are available complete with motor and stand containing storage space for dies and tools. New stand design permits operator to sit at his work. These models are also supplied without stand, hood or motor for use as bench machines.

New Streamlined Torrington Swaging Machines are available in any of six heavy-duty models for swaging of larger size solid and tubular stock.

* Solid diameter capacities listed as a general guide only. They can be exceeded depending on type and hardness of material and extent of reduction.

** For capacity on solid work, refer to Torrington Engineering Department.



Crucible special shapes

for better special steel parts at lower cost . . .

If you're machining intricate sections from solid bars—or using expensive forgings—stop! Choose instead, a *Crucible special shape* that approximates the finished part. *Crucible special shapes* eliminate rough-machining operations . . . reduce scrap losses.

There's practically no limit to the *special shapes* available at Crucible, in a wide variety of special steels. Rolls for over 400 special shapes are available—other shapes can be rolled to your specifications. Your local Crucible representative can give you the whole story of how *special shapes* can cut costs—save time. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

ask the man on the production line . . .

"I want P-K® self-tapping screws . . . I make more money with 'em!"

TV production line at Motorola, Inc., Chicago, Illinois

He does! You do, too!

Pay a man on a unit basis and he wants only the fastener that speeds production and eliminates rejects. That's why P-K Self-tapping Screws are preferred by men on the assembly line. They know through actual use that Parker-Kalon Self-tapping Screws are headed, threaded, pointed and hardened to keep assembly lines trouble-free!

Men in charge of production are P-K boosters, too. They know that the cost of the fastener is a fraction of the cost of using that fastener on the line—that P-K screws are actually the most economical. That's why the men who are responsible for production specify Parker-Kalon. They know . . . if it's P-K, it's O.K.

Sold Everywhere Through Leading Industrial Distributors. Warehouse In Chicago, Ill.

PARKER-KALON® *fasteners*

PARKER-KALON DIVISION • GENERAL AMERICAN TRANSPORTATION CORPORATION • CLIFTON, NEW JERSEY

Harper's Bazaar Photograph

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Hydrochloric (Muriatic) Acid
Nitric Acid
Hydrofluoric Acid
Sodium Fluoride
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Trisodium Phosphate
Sodium Metasilicate
Oxalic Acid
Fluoboric Acid
Potassium Fluoborate
Sodium Fluoborate
Ammonium Fluoborate
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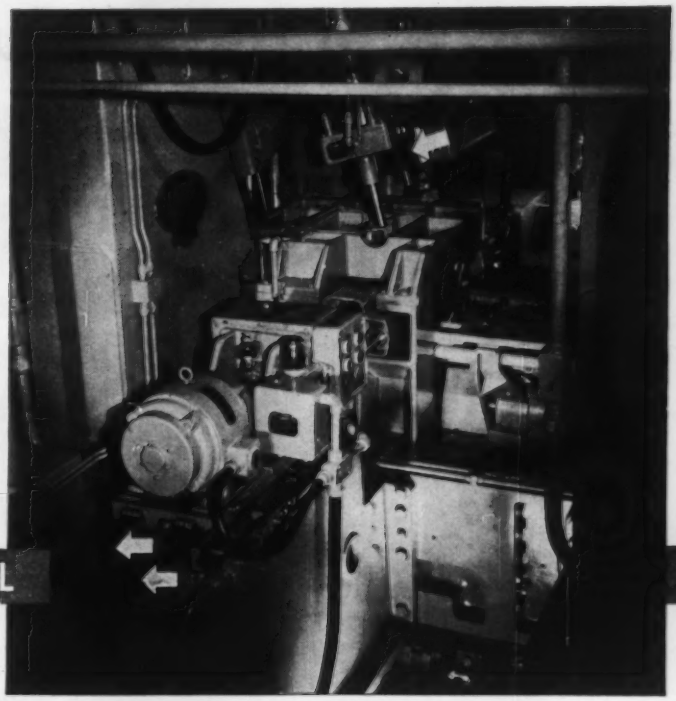
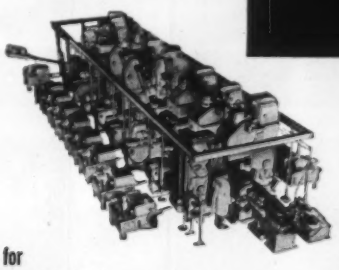
50 Auto Blocks An Hour!

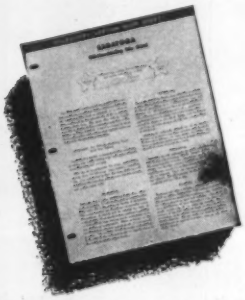
WITH THE HELP OF LUDLUM SARATOGA TOOL STEEL





Ludlum Saratoga was used for the steel ways (note arrows, above) of this giant unit, illustrated at left in a bird's-eye view reduced to miniature size.

Write for BLUE SHEET ON SARATOGA



This concise four-page folder gives all needed handling and shop treatment details on Saratoga. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

Address Dept. S-75

98 SEPARATE OPERATIONS are carried on by this versatile machine which turns out 50 V8 auto engine blocks an hour. It consists of 18 machining units, each of which is fitted with hardened and ground steel ways of Ludlum Saratoga to guarantee accuracy in production.

MILLING, TREPANNING, DRILLING, counterboring, reaming, chamfering, automatic inspection of holes for depth and removal of chips are the operations performed by this amazing mechanism.

LUDLUM SARATOGA WAS USED BECAUSE its extreme hardness, high resistance to wear, and excellent machinability more than met the customer's high requirements for maintaining accuracy in this huge, multi-station machine.

ALLEGHENY LUDLUM METALLURGICAL SERVICE can solve *your* tool or die steel problems. ● Call your local A-L representative or distributor today, or write *Allegheny Ludlum Steel Corporation, Oliver Bldg., Pittsburgh 22, Pennsylvania.*

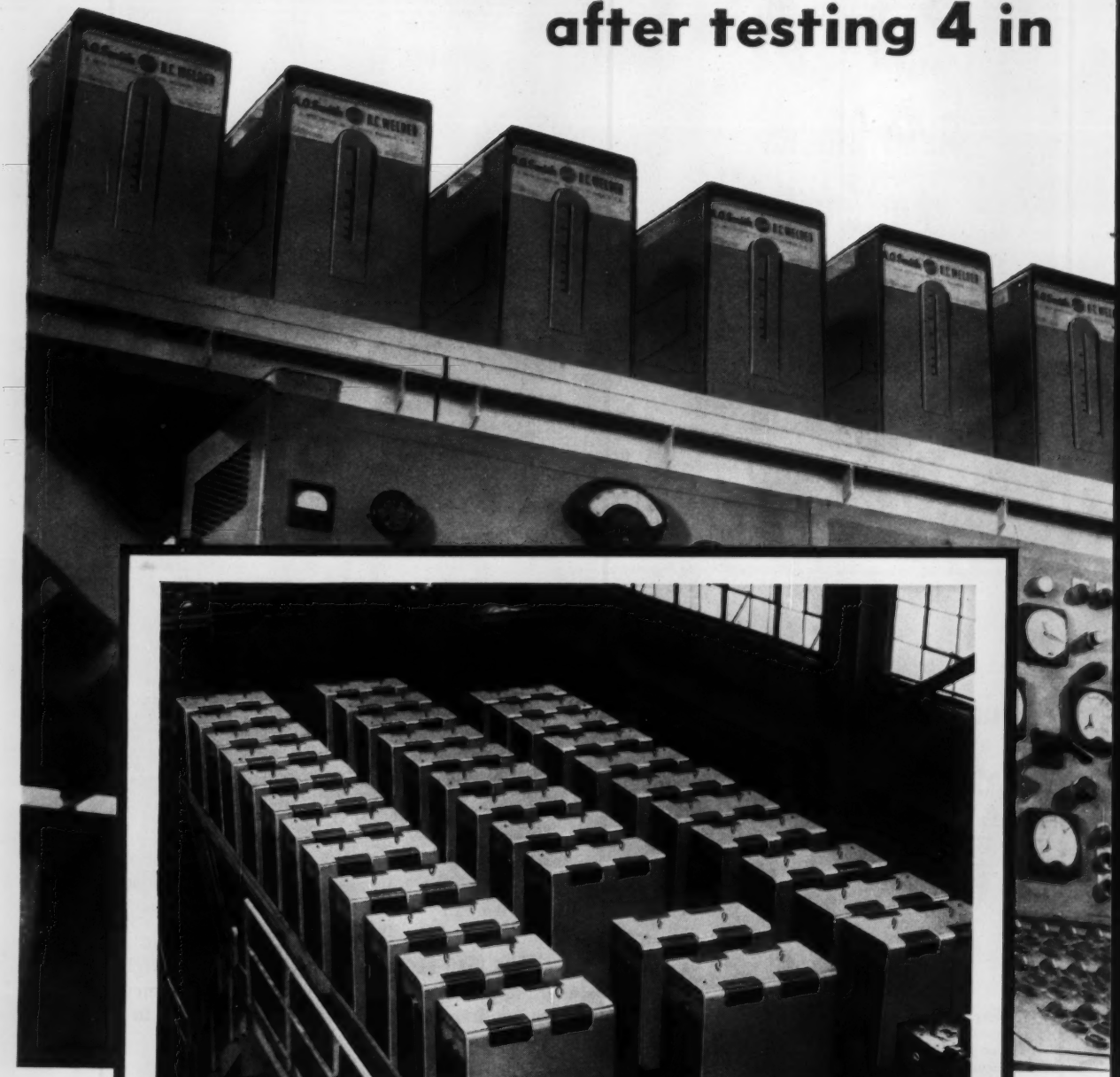
For complete **MODERN** Tooling, call

Allegheny Ludlum

WAD 8155

AL FINE TOOL STEELS SINCE 1854

Titanium producer converts after testing 4 in



A. O. Smith d-c rectifiers located above furnaces are extremely compact, clean in design — require only a fraction of the floor-space that would be used by d-c generators. High-velocity ventilation draws cool air over stacks before blasting it through machine . . . keeps temperatures below critical stage even when units are short-circuited at full-rated amperage.

to A. O. Smith d-c rectifiers

trial by torture!

Mallory-Sharon Titanium Corporation replaced d-c generators with multiple batteries of compact, space-saving A. O. Smith 1000-amp d-c rectifiers. Move resulted from tests which included frequent 'round-the-clock operation . . . sustained short circuits of 20 to 30 seconds duration at currents 88 to 100% above rating.

Rectifiers are remote controlled from central panel. Amperage control is stepless, effortless over full range. In 16 months' operation, despite rugged production schedules, Mallory-Sharon reports performance has been "entirely satisfactory." Rectifiers have no moving parts, are simple to maintain and service.

TO provide a better power source for its titanium double-melting furnaces at Niles, Ohio, Mallory-Sharon installed four A. O. Smith 1000-amp d-c rectifiers on a trial basis. The tests proved them simpler to install, lower in cost per ampere, quieter, more dependable and efficient than d-c generators. Findings were so conclusive that A. O. Smith rectifiers were ordered to replace all rotating machinery.

If you're searching for an a-c or d-c power source for welding, arc furnaces, plating, gas generation or jobs similar to Mallory-Sharon's, A. O. Smith can supply a practical, economical answer. Get the facts on how our dependable standard a-c and d-c units can be easily, inexpensively applied to your operations. See, too, how A. O. Smith's unrivalled experience in the field can save you engineering, and application expense.

Contact your "man from A. O. Smith" or write direct.

The man from A. O. Smith, in this application, is Myron A. Ockerman. He not only assisted Mallory-Sharon engineers in selection and installation of rectifiers; he also worked closely with them in choice of A. O. Smith 600-amp welders for welding titanium ingots together to form progressively larger ingots.

BOOTH 90
WELDING SHOW
MEMORIAL AUDITORIUM
Buffalo, N.Y., May 9-11, '56

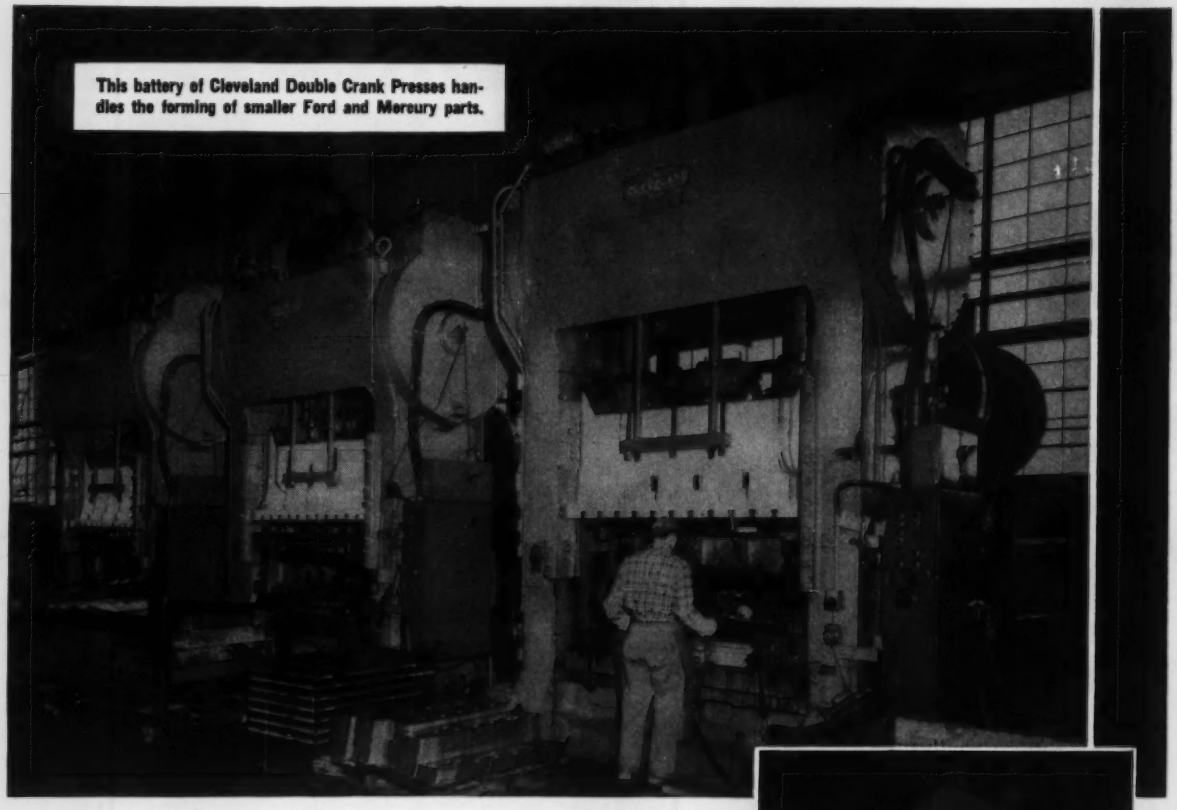
Through research ... *a better way*

A.O.Smith
CORPORATION
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
International Division: Milwaukee 1, Wisconsin

CLEVELAND PRESSES

help Ford produce 120 carloads of stampings daily

Ford's Cleveland Stamping Plant.



This battery of Cleveland Double Crank Presses handles the forming of smaller Ford and Mercury parts.

Since its completion in August of 1954 Ford's Cleveland Stamping plant has been producing Ford, Mercury and Lincoln parts at the rate of 120 carloads a day. Continuous part flow is essential to meet Ford's exactly scheduled assembly lines.

If you're interested in improving your stamping production be sure to check the many advantages designed into each of the 11 specialized types of Cleveland Presses. You'll find that new Cleveland Presses designed to your specific requirements will give you lower operating costs for greater profits. Write or call today.

Two Cleveland 450 ton Underdrive Presses head the production line forming Ford package trays.

THE CLEVELAND PUNCH & SHEAR WORKS CO.

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POWER PRESSES – FABRICATING TOOLS

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CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT

Does Your Product have this "BUY-SIGN"?

The sign that makes the sale is often this "buy-sign" — the tell-tale American Phillips recessed head screw that says this product was assembled by professionals.

For the presence of American Phillips fasteners is more than a mark of quality, it is the sign of a professional who knows how to do the job best.

More than that, it is a source of profit to the manufacturer, for American Phillips saves money at every turn . . . cuts assembly costs because it drives faster, cuts rejects because the driver can't slip to mar the finished surface.

In fact, American Phillips recessed head screws are so effective in cost-cutting that they can save you up to 50% of your total fastening costs.

Want to learn more about how they can save you money and improve a product's sale-sense? Write

X *marks the spot . . . the mark of extra quality*

AMERICAN SCREW CO.

PHILLIPS HEADquarters
WILLIMANTIC, CONNECTICUT

Plants at Willimantic, Conn. and at Norristown, Pa.
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Office, Detroit, Michigan

I'll tell you why . . . because they're designed to take all the punishment of mass-production plating—and last far longer. Hanger assembly is built extra rigid to reduce maintenance. It slips right into those new-type saddle brackets on the tank for extra strong support plus greater ease in handling. That's a typical H-VW-M performance-proved feature.

And no matter what the plating problem there's an H-VW-M Mercil Type Cylinder built for the job. For example . . . Plexiglas, with ribless, one-piece, convex panel construction—ideal for temperatures to 180°F. . . . or Melamine, for use in temperatures to 210°F. Every type is available in a wide variety of sizes—with a broad choice of contacts—in addition to the standard flexible dangler. Individual motor drive is standard equipment, although bevel-gear drive is available if desired. You'll get a better plated product from these barrels—a more uniform deposit—*much more economically.*

Plating barrels are just one of many results of over eighty years of constant plating development — a continuing policy summed up in H-VW-M Platemanship . . . your working guarantee of the best that industry has to offer— not only in plating barrels—but in every phase of plating and polishing.

⊕ 8655

Photo courtesy of H. L. Judd Co., Wallingford, Conn.

For full information on H-VW-M Mercil Type Plating Barrels ask for Bulletin PB-108.

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, N.J.

Plants: Matawan, N. J. • Grand Rapids, Mich.

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INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

Production

is behind SANDVIK SPRING successful performance

Sandvik specialty steels are carefully produced in relatively small quantities which facilitate closer control and uniform results.

Pure Swedish ore and coniferous, sulphur-free fuel are used to produce pig iron of unusually high quality. Sandvik's small blast furnaces and steel furnaces afford closer control of the quality of each heat.

In the subsequent rolling and annealing operations, Sandvik applies its specialized experience, skill and equipment, — "tailoring" the steel to the precise gauge, hardness and surface finish required.

The final result is the inherent quality which has made Sandvik spring steel successful in so many exacting applications.

You can get Sandvik strip steels:

- **In special analyses for specific applications.**
- **Precision-rolled in thicknesses to fit your requirements.**
- **In straight carbon and alloy grades.**
- **Annealed, unannealed or hardened and tempered.**
- **Polished bright, yellow or blue.**
- **With square, round or dressed edges.**
- **Wide range of sizes in stock — also slitting facilities available.**

Ask your nearest Sandvik office for further information or technical assistance.

Sandvik Swedish Specialty Strip Steels are used for Textile Machine Parts such as sinkers, needles, etc. • Band Saws (metal, wood and butcher) • Camera Shutters • Clock and Watch Springs • Compressor Valves • Doctor Blades • Feeler Gauges • Knives such as cigarette knives, surgical, etc. • Razor Blades • Shock Absorbers • A Wide Variety of Springs • Trowels • Reeds: Vibrator, Textile, etc. • Piston Ring Segment and Expanders • and many other applications.

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SS-104

Can the Skills of Small

G-E DEFENSE SUBCONTRACTORS TYPIFY THE BENEFITS RESULTING FROM TEAMWORK BETWEEN LARGE AND SMALL COMPANIES

Over the years, General Electric defense subcontracts have been a valuable proving ground for many small businesses. Some 17,000 G-E subcontractors and suppliers have received much of the work—and the dollars—involved in G-E defense orders.

General Electric is today vigorously at work on many defense projects. But as the Armed Services iron out high volume peaks brought about by past emergencies, many G-E subcontractors have the capacity to work on other projects.

INTERDEPENDENCE OF LARGE AND SMALL BUSINESS helps growth of both when working together. William Friedman and David Krieger, part of Bogart Manufacturing's management team, review a production unit of special radar test equipment made for General Electric.

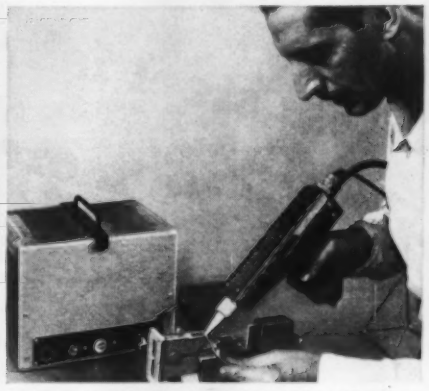
Business Firms Help You?

What these firms are doing for General Electric, many of them may be able to do for you—metal work, precision machining, rolling, forming, cutting. Some have special skills in building components, too. Take for example the Bogart Manufacturing Corporation of Brooklyn (pictures below):

Since 1949, Bogart has worked with G.E.'s Naval Ordnance Dept. at Pittsfield, Mass., on equipment for military radar testing. The company builds radar components and assemblies for fire control equipment. To get its G-E work done, it developed ingenious new techniques in assembly and manufacture. Nor did Bogart's size stand still while working with G.E. It tripled its manufacturing area, increased its employees from 50 to 150—proof of its ability to do a job, its confidence in the future.

Take a look around. *Can* you use the skills of small business in your operations? For further information, see the box below.

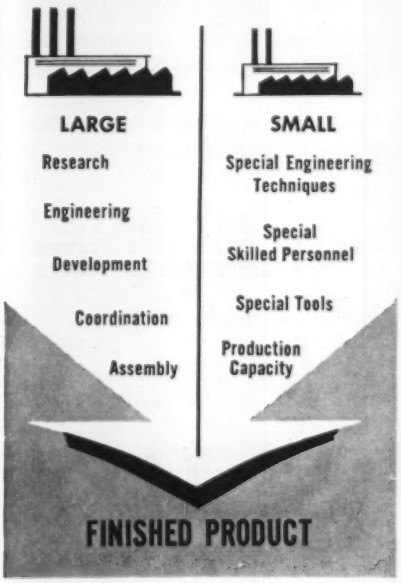
SMALL BUSINESS provides special talents, such as design of new switch in Bogart model shop, to fill needs of larger businesses—typifying industrial partnership.



NEW TECHNIQUES, like ultrasonic soldering with aluminum, help increase Bogart's capacity for additional non-defense work. Staff has grown from 50 to 150 in six years.

OSCILLATING RADAR unit, made by Bogart, supplements big-scale radar equipment made by larger electronic firms.

HOW LARGE AND SMALL BUSINESS CONTRIBUTE TO NATIONAL PRODUCTION



Can Small Business Help You?

Thousands of small businesses, like the Bogart Manufacturing Corporation, have furnished General Electric with virtually every kind of skill and service as defense subcontractors and suppliers. Some of these companies have available production capacity, created in large part by the reduction of defense orders since the Korean War peak. This means that they may be able to apply their skills to help you.

If you have a manufacturing problem or have work available for subcontracting, please write us on your letterhead, stating in as much detail as possible the type of services or skills you require. We will be glad to suggest several small businesses who have done similar work for us and may be able to help you. Write C. W. Bryant, Manufacturing Services Div., General Electric Co. 570 Lexington Ave., New York 22, N.Y.

642-6

Progress Is Our Most Important Product

GENERAL ELECTRIC

Why

buy plated parts . . . when stainless steel fabricated parts cost no more?

Sound fantastic? It really should be. But Bishop's "Tube Mill Pre-fabricated tubular parts" give you major savings that permit you to buy stainless steel at about the same price as a plated part.

Think what this means! Better, longer-lasting, non-corrosive parts . . . increased quality that will give your product extra sales appeal . . . and durability for extra years of service.

These savings are made possible because Bishop, one of America's leading re-drawers of stainless steel tubing, is the *only* mill that makes a specialty of precision fabricated tubular parts.

"Under one roof" redraw and fabrication facilities mean savings in time, transportation and handling costs . . . savings that are passed on to you in lower per unit costs.

And all Bishop "pre-fabricated" parts are made from Bishop-drawn stainless steel tubing . . . the tubing of quality-conscious buyers.

On your next order, why not compare price tags? Send your prints and specifications, or let our engineering department design to fit your needs. Quotations will be returned promptly.

Whether stainless steel tubing or stainless steel tubular parts, you can't buy better than Bishop.

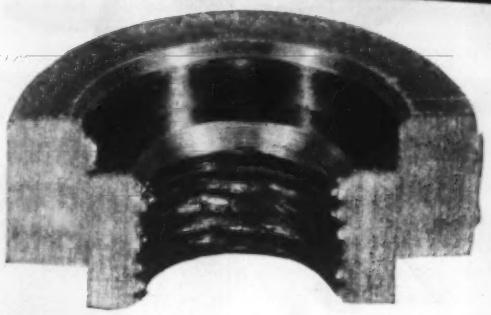
Catalog on Request

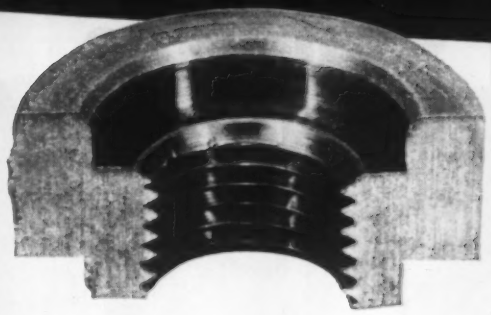
THE ONLY REDRAW MILL THAT SPECIALIZES IN PRECISION FABRICATED TUBULAR PARTS

J. BISHOP & CO. • Platinum Works

STAINLESS STEEL DIVISION, MALVERN, PENNA.

Why BALANCED CHEMICAL ACTIVITY in a cutting oil?





Left. Cupro-nickel bushing, cut in half to show internal threads, produced with a competitive straight oil.

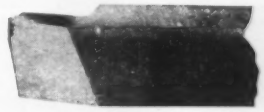
Right. Same type cupro-nickel bushing produced with Stuart's Thredkut X-18—providing controlled chemical activity.

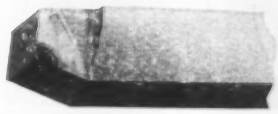
The touch of a cutting oil with *balanced* chemical activity is easily recognized. It's the exceptionally smooth, satiny finish on part after part, even from soft, tough, stringy material . . . and increased tool life.

Stuart's Balanced Cutting Oils have controlled active sulphur and chlorine held in true chemical combination. Each oil is balanced to meet a specific range of job requirements from tapping, threading, gear shaping and gear hobbing to general purpose automatic screw machine work. Stuart oils with high sulphur activity are processed for the more difficult machining of soft, tough, stringy materials such as low carbon and stainless steels, monel metal and jet engine alloys. Oils with lower sulphur activity are designed for high speed machining of free-cutting materials such as B1112, B1113, leaded screw stocks, brass and aluminum alloys.

The "active" sulphur content of Stuart's Balanced Cutting Oils, as opposed to "lazy" sulphur, provides the anti-weld qualities that are so necessary to obtain smooth finishes. The active chlorine and fatty oil content provides the improved lubricity and temperature control to assure the best possible results in production.

Have "the Man in the Barrel", your Stuart Representative, assist you in selecting the right cutting oil for your job. Write for Stuart's Cutting and Grinding Fluid Selector and Dilut-O-Graph Folder, too. It's a quick guide to starting recommendations on any job.





Top: Abnormal front clearance wear of cutting tool caused by excessive sulphur activity of cutting fluid.

Bottom: Cratering of cutting tool caused by insufficient sulphur activity.

D. A. STUART OIL CO., LTD., 2735-37 S. Troy St., Chicago 23, Ill.

More than a "Coolant" is Needed

Stuart Oils

Plants in: Chicago, Detroit, Cleveland, Hartford, and Toronto, Ontario.

Branch Warehouses and Representatives in principal metal working centers in the United States, Canada and Europe.

Time Tested Cutting Fluids and Lubricants

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AMERICAN WELDING

STEEL

March 12, 1956

Metalworking Outlook

Steel Demands

Steelworkers are giving alarming emphasis to premium pay demands for week-end work. The union's wage policy committee, meeting in Chicago last week, said the added cost "would not be prohibitive." To keep a piece of mill equipment going continuously would cost 55 cents more per hour per worker if premiums were paid for Saturday and Sunday work. Now, the industry pays premiums for sixth and seventh consecutive working days. The average cost of such a demand for the industry would be a little less than 55 cents per worker because not all steel operations are continuous. If any issue tangles steel negotiations this year, it will be that one. Other major demands to be made at parleys that probably will begin late in May: Higher wages, SUB and a full union shop.

SUB: Where's It Going?

SUB will probably never spread widely beyond the steel, farm equipment, auto and auto parts industries, believes Sumner H. Slichter, Harvard professor who spoke before the Associated Industries of Cleveland last week. He thinks that only one out of ten U. S. workers will ever be covered by SUB. However, SUB publicity is likely to boost state jobless compensation substantially.

Fourth Quarter Pickup?

The economy will continue at present levels until the beginning of the fourth quarter. Then, Professor Slichter predicts a rise. He sees gross national product hitting $400 billion this year for the first time.

More Steel Expansions

Youngstown Sheet & Tube Co. will boost its ingot capacity 1 million tons in the next two years. Look for about 400,000 tons to be added in Youngstown and 600,000 tons in Chicago. Cost? An estimated $250 million, compared with $241 million spent in the last five years . . . Colorado Fuel & Iron Corp. plans to spend some $23 million in the fiscal year ending June 30 on modernization and development.

Senate Studies Missiles

Watch for more Congressional talk about our military unpreparedness, especially in guided missiles. The Senate has a subcommittee studying the subject even though the missile is supposed to have top priority now. The budget provides almost $1.5 billion for missile research in fiscal 1957.

U.S. and Atomic Power

No large-scale government building of atomic power plants is in store if AEC's chairman, Lewis L. Strauss, has his way. He wants to leave the job to private industry. Commissioner Strauss predicts that industry will spend

Market Outlook—p. 219

some $275 million on power projects in the next seven years; some $20 million or $25 million of that this year. He wants the government's role limited to research and development. Some 15 civilian atomic power plants in the works are scheduled for completion before 1962. They involve an outlay of more than $500 million, about half of which is being financed by the U. S.

Aircraft Research Increases

The U.S. aircraft industry in the last five years has reinvested more than $1 billion of its own capital in research and development facilities and projects. All American industry will spend $3.7 billion in that area this year, 20 per cent of which will be in aircraft.

Another Extrusion Press?

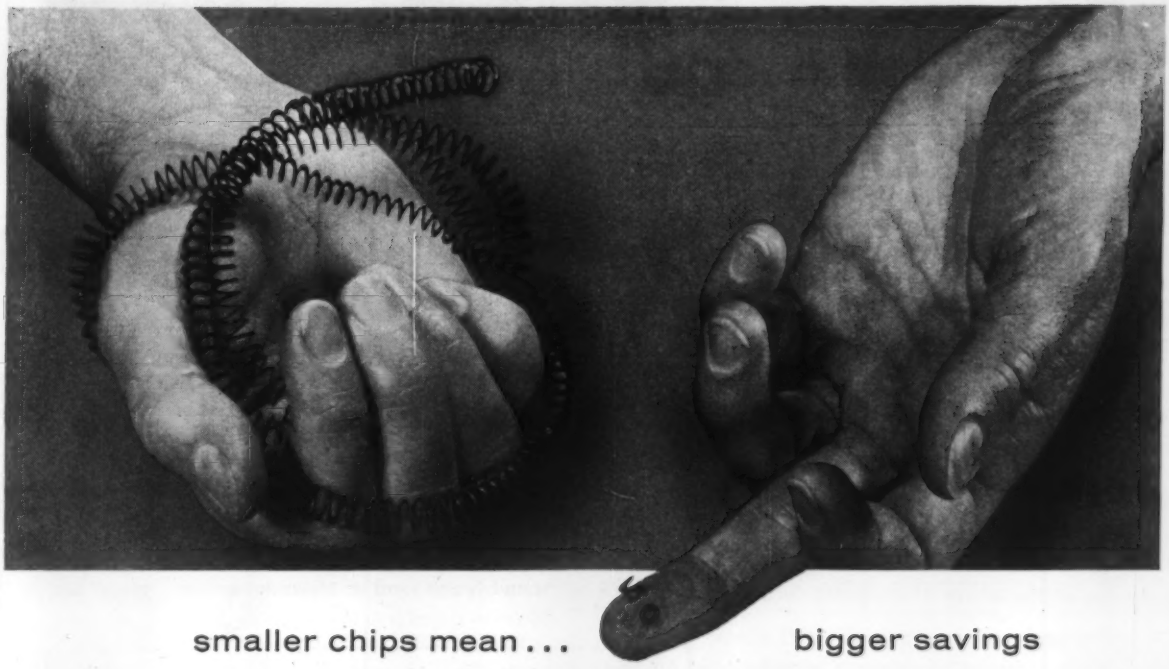
The Air Force is considering ordering a 20,000-ton extrusion press that would be operated by Aluminum Co. of America at Lafayette, Ind. Specifications would call for the extrusion of titanium and stainless steel, as well as aluminum. If and when the Air Force makes up its mind to ask for bids, another two years would elapse before the press could be completed.

Zinc Output Up

Zinc production reached a daily rate of 2977 tons during February, reports the American Zinc Institute. That's an increase of some 64 tons a day over January totals. Because of the shorter month, total production dipped from 90,313 tons in January to 86,329 tons in February. Unfilled orders, showing the effects of automotive cutbacks, dropped from 60,717 tons in January to 45,255 tons in February.

Straws in the Wind

Electric Auto-Lite Co. is setting up a $500,000 unit to make stamped aluminum grilles and trim; most of the money is going for anodizing equipment for production on '57 autos . . . Chances for a cut in personal income taxes are dimming, though they're not dead . . . "We can look forward to even higher levels of foreign trade in 1956," says Undersecretary of Commerce Walter Williams; 1955 was the second best year on record, exceeded only by 1947 when Europe's postwar reconstruction needs were at a peak . . . The roadbuilding industry is "ready, able and willing" to meet the requirements of the Fallon bill which calls for a $51-billion, federal-state program over 13 years, says John N. Robertson, president of American Road Builders Association . . . Volume of intercity freight transported by truck during 1955 exceeded by 10.6 per cent the tonnage hauled in the previous record year of 1953 . . . Bethlehem Steel Corp. has awarded Koppers Co. Inc. the engineering and construction management contract for the steel melting and primary rolling facilities at the Sparrows Point, Md., plant.



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Three new Ryerson leaded alloys

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The PROOF of the STEEL is in its PERFORMANCE

DSC Welded Wire Fabric Puts a Steel Backbone in Reinforced Concrete.

Courtesy Lamar Pipe & Tile Div., American Marietta Corp.

Here's a section of 120" LO-HED reinforced concrete pipe. You can see how big it is from the trucks and pipe storage yard in the background.

What you don't see is the DSC Welded Wire Fabric embedded in the concrete. It gives the pipe a steel backbone, makes it strong and durable.

For the very same purpose DSC Fabric goes into modern reinforced concrete turnpikes and landing strips—just to mention two of many common uses.

Our Portsmouth Division "weaves" DSC Fabric. The "threads" consist of Portsmouth Bright Basic Low Carbon Reinforcing Wire. The "warp and woof" intersections are spot-welded electronically.

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Adv. Courtesy DSC

Mutual Understanding

One of the most unusual demonstrations of the growing desire on the part of management and labor to understand each other's problems occurred a few days ago in the Ohio river city of Portsmouth, O. The entire community took time out for a "Recognition Day" to pay tribute to "both sides" for their efforts in achieving mutual understanding.

Portsmouth had good reason to celebrate. The city was about to become a ghost city when World War II ended. Except for a shoe factory and a few smaller plants, its people were largely dependent for their livelihood on a steel plant that was about to be abandoned. The city's labor record made it unattractive to new enterprise.

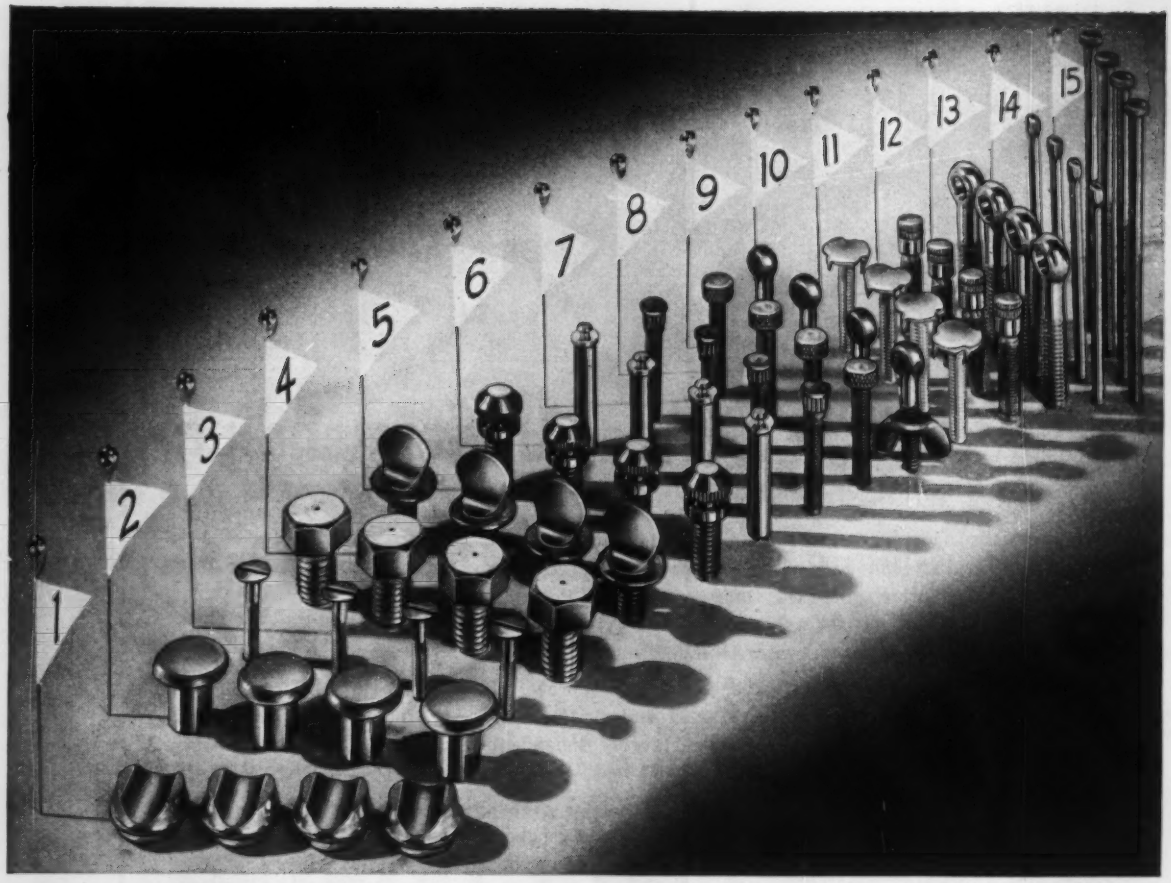
Financier Cyrus Eaton came to the rescue by acquiring the steel plant in June, 1946, and initiating a modernization program. In January, 1950, Portsmouth Steel was consolidated with Detroit Steel Corp. By the end of 1957, $90 million will have been expended on modernization and expansion. Already, jobs have been made for 4200 workers.

At the outset, Detroit Steel's management decided on a policy of dealing frankly with its employees and the community. It initiated a program of supervisory training and management development. It encouraged management personnel to participate actively in community affairs (its blast furnace superintendent is Portsmouth's mayor). Speakers were provided for clubs and societies, and plant tours were set up for community groups. Educational material about the company was made available to schools. A four-year college scholarship in labor relations was set up for Portsmouth high school graduates.

The program for industrial harmony fostered by industry, labor and the community has paid off in many ways. For example: The Atomic Energy Commission picked a site near Portsmouth for its gaseous diffusion plant. Labor agreements concluded in advance made it possible to complete this $1-billion plant (it employs 2700) ahead of time and at savings of millions of dollars.

There is nothing especially unusual about the methods used in Portsmouth. What is unusual is the determined effort to make them work through better mutual understanding.

Irwin H. Such
EDITOR-IN-CHIEF



This Army of Specials Marches to Save You Money

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- Usually a cleaner, stronger, better finished product

If you are using parts like these of any metal other than plain steel in quantity, it will pay you to check with Harper no matter how you are producing them.

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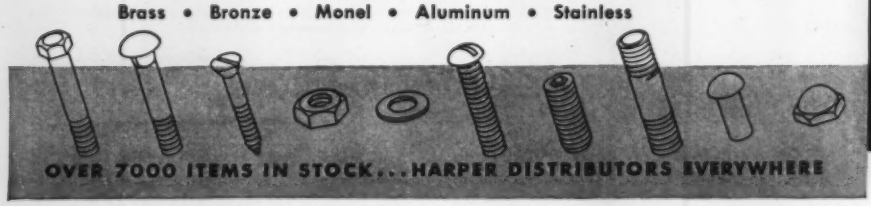
9. Stainless Steel Focusing Screw
10. Stainless Steel Hinge Pin
11. Brass Hold-down Screw
12. Brass Terminal Block Screw
13. Monel Eye Bolt
14. Copper Conductor Pin
15. Stainless Steel Hex Head Stem Bolt



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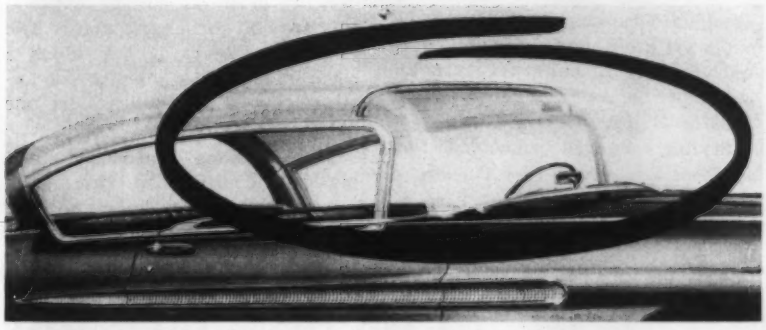
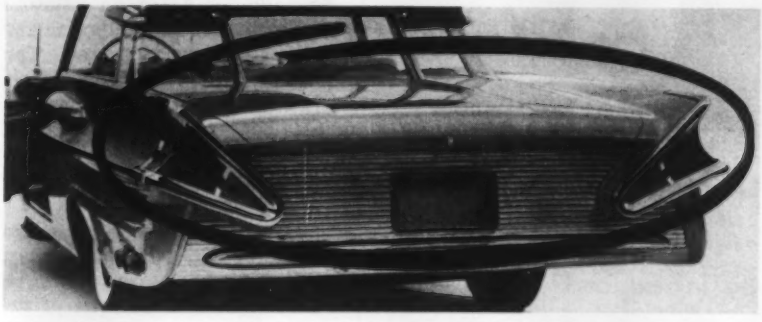


Chevrolet's Impala has new look in windshields, swept up as well as back



Tail-end treatment of the Mercury Turnpike Cruiser will set style in '57

Preview of the '57 Autos

Striking styling features of experimental cars will be built into many '57 models. But rumors to the contrary, don't bet on an earlier model introduction for next year's cars

DETROIT has labeled 1957 the year of the Big Change. The auto industry is pushing tool and die makers and suppliers to get ready for next year's production.

Two questions everyone is asking: When are new cars coming out? What will they look like? Right now, things still are in the rumor stage. Guesstimates shape up like this:

Introduction—It's doubtful that 1957 cars will be introduced much earlier than usual (see chart, next page). Earlier introductions might boost sales if dealer stocks remain high and production lags.

Inventory-sales ratios are beginning to shrink. Production for March and April probably will be about 8 to 10 per cent under last year's record levels. *Ward's Automotive Reports* pegs March output at 609,800 cars, 182,636 under 1955. Even if competition and slow sales should make autobuilders want to jump the gun, there are some cold facts which will make it difficult.

Tooling—As far as anyone can see, 1957 will be the real start of a two-year cycle in auto evolution. Major changes next year, followed by facelifts in '53, are the way things stack up. The industry is scrambling to get tooled up for the big changes this fall. It looks like makers won't be ready before the usual time.

Pattern makers are guaranteed a 64-hour week in Detroit. Diemakers are rushed. Draftsmen are being pirated. One major parts supplier says it won't start the changeover to '57 production before June —the usual time.

Auto companies will be lucky if they can come out even a month ahead of normal schedules. They frankly admit that at this point there's a six-week leeway in fixing opening dates. Tooling and to a lesser extent the competition will be the real determining factors. Take a scant month off the model dates listed in STEEL's table and you may be close to the mark.

Changes—Next year's cars will be worth waiting for. Fall will usher in mass styling and engineering concepts which have been seen only on individual models — mostly sports cars.

It looks like all Chrysler cars are in for basic changes. So are the upper-bracket General Motors models, as well as Mercury, Nash, Hudson, Packard, the Packard Clipper and probably Ford. It's rumored that Pontiac and Chevrolet will have a major facelift but that GM is holding back an all-out change on these cars to lure the 1958 buying crowd.

What are some of these changes? Body frames will shift to the Con-

tinental ladder type (STEEL, Feb. 27, p. 83). At least two manufacturers have indicated they will have a semi-integrated body with floor pan, fire wall and maybe center posts welded in.

It seems likely that Buick will alter its transmission layout to change the hump in the middle into an oval. Step-down triple universal joints (Continental Mark II style) also may appear.

Height—Cars will be lower, although not all of them will reach the 56-in., over-all height of Studebaker's Hawk series. By now, it's unofficially admitted that 14-in. wheels will be on practically all '57 cars. Brakes will have to be changed.

Drum brakes don't have adequate holding power when scaled down to fit smaller wheels (and bigger tires). Look for Chrysler Center-Plane brakes, now appearing on Chrysler, DeSoto, Imperial and Crown Imperials, to be standard on all Chrysler models.

It's probable that the finned brake drum Studebaker has this year will be extended to Packard and Clipper cars. Meanwhile, GM seems interested in a different disc brake, perhaps that developed by Budd Co., Philadelphia.

Bodies—Plastic bodies will still be limited to the Corvette. Tail fins, highlighted on Dodge and Plymouth this year, probably will be turned outward on these cars. Other stylists also are adopting the "Y" look seen on Mercury's Turnpike Cruiser. GM, however, is supposed to have something else in the works—it might be closer to the experimental Centurion developed by Buick.

Styling changes scheduled for wholesale introduction are: Windshields sweeping part way over the top. Chrome trim replaced by sculptured body panels. This gives a subtle, contoured look and cuts down costs. The Packard Predictor may herald the '57 Clipper in that respect—perhaps even to the butterfly roof doors.

In keeping with the safety trend, four-headlamp systems will be seen on more cars, if the six states now prohibiting such setups change their laws.

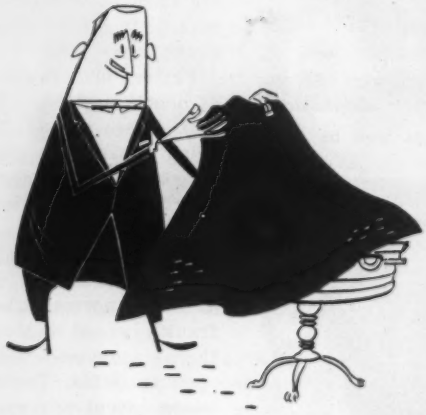
Powerplants — The horsepower race will continue, with 300 and up common on all heavier models. Fuel injection systems will be optional on three of the classy autos. The Continental Mark II, for which a basic change isn't planned for another two or three years, is one likely candidate.

Transmissions—Automatic shifting will continue to gain, with emphasis on better gear and axle ratios to cut down gasoline consumption. Pushbutton shifting will be popular. Chrysler already has announced an added drive gear with a fifth push button. Others will add the parking shift button.

Roundup — American Motors might be a good one to watch for an air-oil suspension system. The retractable hardtop still isn't cinched for '57 production. Rumors split its appearance evenly between next year and 1958. It probably will come on a low-priced, high-volume model.

The trend in materials is toward more aluminum. Hubcaps, grilles and parts of bumpers will be anodized. The same is true of interior trim.

The industry is like a trout fisherman polishing lures for the season. Opening day hasn't been announced, but limit catches are predicted.



When Will '57 Cars Be Introduced?

The best guess is that new models will come out about the same time they did last year. It's unlikely that any will be unveiled more than 30 days ahead of last year's introduction dates which were:

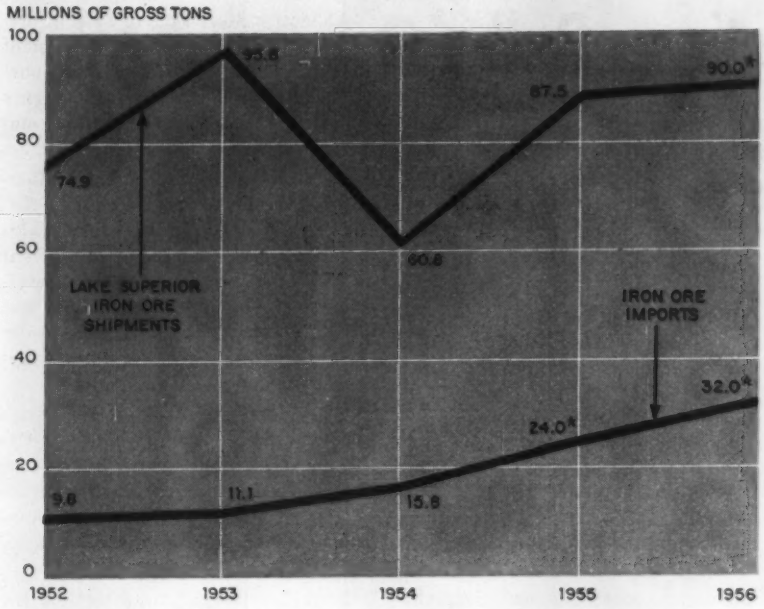
Model Introductions

Nash	Nov. 9	Continental	Oct. 5
Hudson	Nov. 30	Thunderbird	Nov. 2
Rambler	Nov. 29	Chevrolet	Nov. 2
Plymouth	Oct. 19	Pontiac	Oct. 20
Dodge	Oct. 4	Oldsmobile	Oct. 31
DeSoto	Oct. 17	Buick	Nov. 1
Chrysler	Sept. 12	Cadillac	Oct. 24
Ford	Sept. 20	Packard	Oct. 20
Mercury	Nov. 2	Clipper	Oct. 25
Lincoln	Sept. 13	Studebaker	Nov. 17

Tax Write-Offs for Electricity

The Office of Defense Mobilization from Feb. 9 through Feb. 22 issued certificates of necessity for accelerated tax amortization amounting to $464,040,483.

Electric power generating and transmission facilities figured strongly among these certificates: Fifteen projects were in the $1-million-or-more class.



Iron ore shipped to the U. S. from Steep Rock and Michipicoten is reflected in both lake shipment and import figures
Sources: Lake Superior Iron Ore Association; U. S. Bureau of Mines
*STEEL estimate

Big Year Ahead for Iron Ore

HUNGRY blast furnaces are chewing up stocks of Lake Superior iron ore 20 per cent faster than they did last year.

Prediction — As the ore fleets make ready for a heavy shipping season, the U. S. Weather Bureau reports Lake Superior ports should be open between Apr. 10 and 15. That's the normal opening time. Last year it was Apr. 12. The most recent March opening was in 1953.

The Pittsburgh Steamship fleet (U. S. Steel Corp. division) may move as early as Apr. 4. The tendency is to follow the lead of the larger fleets; so operations should be under full steam by Apr. 15.

Lower Stocks — All concerned with iron ore movements on the Great Lakes are hoping for a heavy shipping month in April. On Feb. 1, stocks at U. S. and Canadian blast furnaces and Lake Erie docks amounted to 36.7 million tons—768,559 tons lower than a year ago.

In April, 1955, about 3.8 million tons of iron ore came down from the Lake Superior region. If the same tonnage moves this April, stocks by May 1 will be at least 3 million tons under last year's figure, because of the higher rate of consumption. January's rate of ore use was 8 million tons—1.3 million higher than a year ago.

Outlook—The most conservative estimate of total tonnage to come down from the Superior region this year is 10 per cent under 1955's 87.5 million tons (the Cleveland agent who made the guess has put a $5 bet on it).

But most ore carriers are talking in terms of a "big year" equal to 1955 or slightly better.

Imports Up—The steadily rising import curve (see chart) does not necessarily mean lowered lake shipments. Shipments of ore to the U. S. from Steep Rock and Michipicoten in Canada are reflected both as imports and lake shipments. The two regions yielded almost 4 million tons of ore last year; Steep Rock alone will produce 3.25 million tons in 1956.

However, the total yield from the U. S. side of Lake Superior will not go up in the next five years. Imported ore is apparently going to feed the increasing needs of U. S. furnaces.

Old Faithful—This may be the last year the Mesabi range will be able to increase its output over that of a preceding year. Direct shipments were some 46 million tons in 1955, and may go up another million in 1956. By 1960 they'll be down to 30 million tons.

John Sherwin, senior managing partner, Pickands Mather & Co., Cleveland, reports the Erie Mining Co. taconite plant will go into production the summer of 1957.

By 1960, taconite will offset lowered direct shipments. Last year, 1.5 million tons of the beneficiated ore went to the furnaces; an additional million tons will be processed this year. That makes a total of about 50 million tons of direct shipment ore and taconite this year. If 20 million tons of taconite comes down in 1960, the total for that year (taconite and direct shipment ore) also will be 50 million.

After 1960, however, no increased shipments from this side of Lake Superior can be expected.

Other Sources — The Quebec-Labrador field will ship 12 million tons this year—much of it to the U. S. Last year, Canada provided the U. S. with about 10 million tons. That country is fast approaching the point of supplying half this country's imports. It could happen in 1956.

Production of the Bristol Mines in Quebec is scheduled for late 1957, says Mr. Sherwin.

Venezuela shipped 7 million tons of iron ore to the U. S. last year, Brazil about 950,000 tons, Liberia more than 900,000 tons. All shipments were up substantially from 1954's.

Some foreign sources are shipping less: In 1955, Sweden dropped to 1.2 million tons from 1.7 million in 1954; Peru to 1.5 million from 1.9 million; Chile to 1 million from 1.7 million. These trends will continue into 1956.

Tendency—Three factors tend to keep imports of iron ore at a minimum. 1. Heavy demand for ore in Europe. 2. High ocean freight rates. 3. High iron content of the foreign ore imported, which means that more iron can be obtained from less tonnage.

Centrifugal Castings Roll

Pipe foundries expect business to be nearly as good as in 1955's peak year. Other centrifugal casters are widening their markets through improved products

ANOTHER YEAR of high production is expected by the makers of centrifugal castings.

Pipe foundries are the biggest segment of the industry. Almost 100 per cent of pressure pipe is cast centrifugally. S. E. Linderman, Cast Iron Pressure Pipe Institute, says: "Our best year was 1955. This year may be off a little, but it still will be a good one." STEEL estimates that shipments of pressure pipe this year will hit 1,450,000 net tons.

The institute lists shipments in recent years this way:

Year	Net Tons
1955	1,540,000
1954	1,307,000
1953	1,145,000

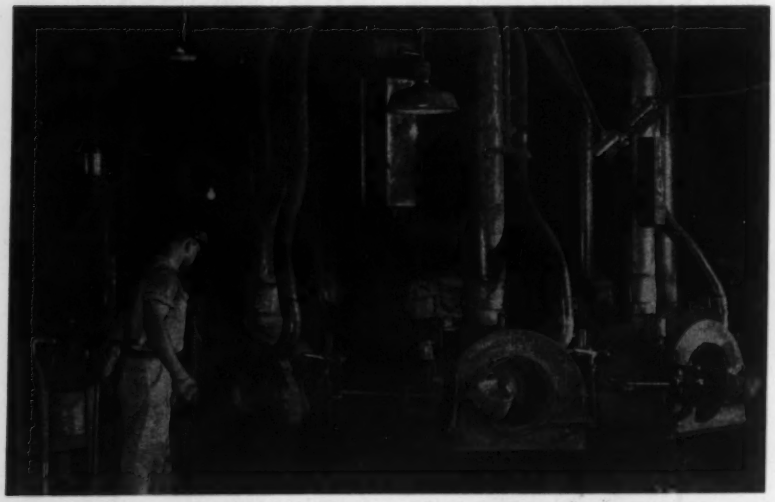
Mr. Linderman expects shipments in the first half of the year will be at the 1955 pace, after that they may slip a little but not too much. He says: "The market is there; we've got to sell it."

Market Factors—The big season for pipe laying (especially in the North) is spring and summer. Top tonnages go into water transmission and distribution, gas distribution, pressure sewers and industrial piping. The trek to the suburbs is helping the business.

Soil pipe shipments depend to a large extent on new housing starts. If they ease off this year, shipments of soil pipe and fittings probably will come closer to 820,000 tons than the peak (869,515 tons) they hit last year. But a much smaller portion of soil pipe is cast centrifugally.

Other Big Uses—After cast iron pipe come bushings and bearings. Metals cast most often after gray iron are bronze and special steels. Smaller amounts of aluminum and magnesium are cast centrifugally because many large wrought and fabricated bushings are available.

Getting Better — New developments are making old products better and new ones possible. J. F. Klement, technical director, Ampco Metal Inc., Milwaukee, says new casting machines are more versatile and compact. Larger castings (and smaller ones) can be made. He states: "Less time is being spent in setup because of simpler design of dies, dieholders, covers and pouring spouts."



Buick centrifugally casts its gray iron brake drums

Electric Steel Foundry Co., Portland, Oreg., claims the development of a wash that gives casting surfaces a finish that is roughly equivalent to a 250-microinch machined surface.

Nathan Janco, president of Centrifugal Casting Machine Co., Tulsa, Okla., calls the use of thin-walled, water-cooled, permanent steel molds an outstanding development. The mold costs less but lasts longer. It can make heavy wall castings, such as steel mill rolls and cement mill rolls.

Development Work — Mr. Janco says work is being done on the centrifugal casting of hollow ingots which would be further processed to make steel tubing and in some cases bimetallic steel tubing.

Centr-O-Cast & Engineering Co., Detroit, is developing a method for the off-center casting of various shapes.

A Necessity—Centrifugal casters must keep on their toes. Because of the specialized nature of their products, an industrial change can take away a big share of their market quickly.

Hunt-Spiller Mfg. Corp., Boston, has centrifugally cast bronze piston rings for steam locomotives over 30 years. Recently, it expanded its production to include gears and bushings. Its production of piston rings diminishes each year because of the dwindling number of steam locomotives. But by 1958, Hunt-Spiller expects industrial applications to more than make up for lost locomotive business.

New Atomic Power Plant

General Electric Co. and Pacific Gas & Electric Co. have joined hands to build an atomic power plant in the San Francisco bay area.

Plans call for completion of the facility during 1957. The cost: Between $3 million and $4 million. No government money is involved. Initial capacity will be 5000 kw. GE officials say that the boiling water reactor will serve as a pilot experiment for the 180,000-kw station that the company will build near Chicago for Commonwealth Edison. This plant is scheduled for completion in 1960.

Graver Tank & Mfg. Co.

Tight supply of steel plates causes backlogs to grow as . . .

Weldment Sales Stay High

SALES of weldments this year may top those of 1955. The high level of business attained in the last half has carried over into the first quarter of 1956.

Backlogs are increasing moderately as a tight supply of steel plates is handicapping production. Captive shops are operating at higher rates than commercial shops.

Every welder comments on plate shortages. Typical: Louis T. Kenney, vice president and general manager, United Welding Co., Middletown, O., figures his company could boost sales 20 per cent if it could get the steel.

Extra Competition—Sharp fighting for business developed in 1954 when metalworking activity was declining. This competition carried well into 1955 before volume rolled up to a substantial level in the latter part of the year.

During the slack period, there was a tendency for railroad locomotive and carbuilders to seek commercial weldment business. Some of this influence remains.

The Business—Heavy goods predominate, including products like machinery, machine tools, presses, turbines, generators, cranes, earthmoving and ship propulsion equipment. Presses have moved forward faster than most applications. There is a good increase in special welded structures used in tunnels, such as vehicular tubes and subways. Among the newer uses for weldments are vacuum chucks, or hold-down devices, for airplane wing skin mills.

Better Weldments—R. V. Proctor, vice president and general manager, Commercial Shearing & Stamping Co., Youngstown, O., states the new, iron-powder, low-hydrogen welding electrodes are speeding up welding and producing high-strength, high-quality welds.

W. F. Sheetz, president and sales manager, R. C. Mahon Co., Detroit, comments on improvements in methods and the trend to automatic operations which make weldments more reliable.

New alloy steels, strong, tough, ductile and with good weldability, make weight reduction possible without loss of strength.

Sizes and Costs — Weldments weigh from a few pounds up to many tons and can be made singly or in quantity. When many are made, the welder uses jigs, fixtures and welding positioners to standardize and speed operations.

Many weldments combine steel castings with rolled steel to take advantage of the special attributes of the casting process as well as welded fabrication.

S. G. Falk, manager of the foundry and weldment division, Falk Corp., Milwaukee, notes that the producer of commercial weldments usually ends up doing a good share of the machining.

Deliveries on machine tool bases or large presses range from two to six months—for small weldments, only a month or two. Some manufacturers name delivery dates based on receipt of steel.

Puzzle — Manufacturers agree weldments must be sold if their business is to expand. "Developing markets," says W. M. Broxham, vice president-sales, Graver Tank & Mfg. Co., East Chicago, Ind., "is the problem." But with steel so tight, it's hard to do the aggressive selling job needed to expand.

Gold Aluminum Without Dye

A new method of producing nonfading, gold aluminum in a variety of shades and tones has been developed by Kaiser Aluminum & Chemical Corp.

GOLD ALUMINUM made without dyes or other coloring materials is Kaiser Aluminum & Chemical Corp.'s contribution to those who will use more anodized aluminum (STEEL, Feb. 27, p. 110).

Experimentally, Kaiser has produced the new material (soon to be available commercially in sheet form) at its Trentwood, Wash., rolling mill. Work is in progress to adapt it to other forms, such as extrusions.

Variations—By anodizing under readily controlled conditions, the color may be varied from pale straw to deeper bronze tones, and the finish may be either bright or satin.

The nonfading property makes the material suitable for a wide range of exterior architectural applications, furniture and home appliances, as well as automotive trim.

Elimination — The process is patented. By eliminating the dyeing step, finishing is simplified and results in substantial time savings, Kaiser officials say.

Development is under way on an alloy designed for decorative ware and other applications where an exceptionally bright, gold finish is desired.

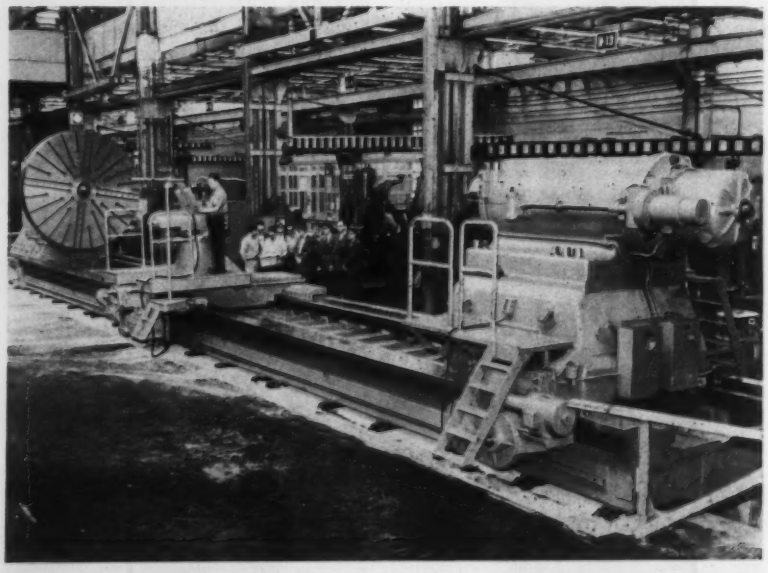
The Process—Production begins with the addition of certain readily alloyed constituents to molten aluminum. The resulting alloy is the color of normal aluminum until it is anodized.

In sheet form, the alloy is applied as an integrated cladding in the same way that Alclad sheet is produced.

The practice in most applications will be to form the metal and fabricate the products or component before anodizing.

Holds Up—The material was subjected to tests simulating seven years of sun exposure under the worst ultraviolet conditions known to exist in the U. S. The color change was imperceptible to the eye, company officials report.

As is the case with existing anodic finishes, the new process increases corrosion protection and resistance to wear.



Built for the Big Jobs

200-ton jobs are a whiz for this Betts-Bridgeford lathe, which measures 55 ft between centers and has a 144-in. swing. General Electric's Large Motor Department paid $500,000 for it, betting on demand for bigger generators, motors

Dollars in Pensions

Survey of 120 pension plans shows retirement pay totals nearly 60 per cent of earnings

RETIREMENT PAY and social security benefits can add up to $2118 a year for a retired employee with yearly earnings of $3600 and 30 years of service.

A survey of the National Industrial Conference Board analyzes it this way: The average pension for such a worker is $78 a month; social security benefits are $98.50 a month.

Bigger Checks — Workers who average $6000 a year over a 30-year career get an average pension of $152 a month, the survey shows. This, added to social security benefits of $108.50 a month, brings the employee $3126 a year, or 52 per cent of his average earnings.

Top Benefits — Contributory plans pay larger retirement benefits than noncontributory plans among the 120 plans analyzed.

Plans which are not negotiated with a union pay more than those that are.

Manufacturing firms do not pay benefits so large as nonmanufacturing companies.

Plans that vary benefits according to earnings provide larger payments than those that give a flat amount.

Plans that deduct social security payments from the pension provided by the plan's basic formula pay less than plans that do not deduct social security.

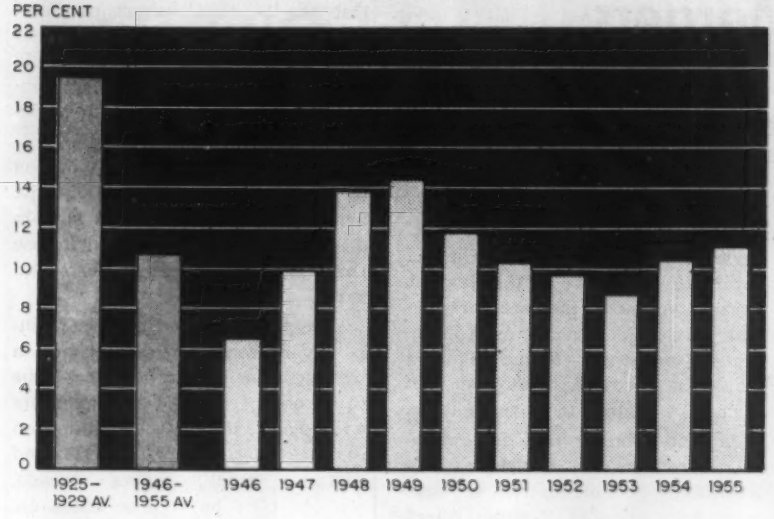
The size of the company does not seem to be related to the size of the pension.

Biggest Year for Standards

The American Standards Association approved 238 standards in 1955, compared with 153 approved in 1954, and 388 projects on standards are being carried out under ASA auspices, reports Vice Adm. George F. Hussey Jr., managing director.

Manufacturing Profits

(Adjusted and expressed as a percentage of income)



Source: Machinery & Allied Products Institute

Profits Only Look Big

RECORD - BREAKING, after - tax profits are catching a lot of headlines these days (STEEL, Feb. 13, p. 41), but there's a cloud around the silver lining.

The Machinery & Allied Products Institute, Washington, has analyzed postwar and predepression net profits of manufacturing corporations in terms of the shrinking purchasing power of the inflated dollar.

Adjustments—The MAPI study adjusts profits for the two periods (1925-1929 and 1946-1955) by recalculating three factors in current dollars: Depreciation, inventory and the effect of the five-year amortization.

For the predepression period, the average adjustment is negligible. For the postwar decade, the adjustment reduces real profits by an average $2.5 billion a year. Corrected, after-taxes profit figures for the two periods compare in this manner: 1925-1929—$3.5 billion a year; 1946-1955—$7.5 billion a year. The corporate tax rate has ranged from 38 per cent (1946-1949) to 52 per cent (since 1951), in contrast with 11 and 13.5 per cent in the 1920s.

Exaggerated — MAPI contends this adjustment procedure is necessary to even make a start at understanding today's true profit picture. In 1955, for example, reported net profits came close to the $12-billion mark. The corrected figure is about $10.3 billion.

This is not the complete story.

Profits, says MAPI, must then be measured against income produced. Conclusion: Profits as a percentage of income produced now range far below the level of the 1920s (see chart).

Average — Moreover, 1955, instead of appearing as the best profit year, finishes the decade quite near the average for the whole postwar period. Within the decade, profits as a percentage of income hit their highest level in 1948 and 1949, and then retreated under the impact of the post-Korean excess profits tax.

The percentage figures for the two periods are: 1925-1929—19.4 per cent; 1946-1955—10.6 per cent.

Work Injuries Rose in 1955

More than 1.9 million workers were injured or killed by on-the-job injuries during 1955, says the U. S. Department of Labor. Deaths are estimated at 14,200. Both injuries and deaths were up slightly from 1954 but well below other recent years. Expanded employment and longer hours generally accounted for the rise.

Injuries in manufacturing rose 5 per cent. Mining injuries did not increase.

Three thousand business and labor leaders, and other interested parties, will meet in Washington, May 14 to 16, to devise co-operative ways to reduce occupational injuries.

Freight Rates Rise

Average boost of 5 per cent will bring the railroads an additional $423 million

THE FIRST general increase since World War II has boosted most of the nation's freight rates 6 per cent.

Railroads sought a 7-per-cent hike to cover heavier wage and material costs, but the Interstate Commerce Commission pared down that demand last Wednesday. On some commodities, it imposed holddowns which limit the general increase to about 5 per cent.

Limitations—Rates for anthracite and bituminous coal and coke are up 6 per cent, but are limited to 15 cents a ton. However, the commission put an 8-cent-a-ton ceiling on increases for coal or coke moving by rail-water routes. On a rail-water-rail shipment, the railroad hauling the coal from the second port to the destination is allowed a maximum boost of 7 cents a ton.

Rate increases on lignite coal and lignite coal briquettes are pegged at 3 per cent, with a maximum of 7 cents a ton.

The increase on building woodwork and millwork was held to 7 cents per 100 lb. The rate boost on lumber was held down to 6 cents per 100 lb.

Other Rates—The maximum increase on phosphate rock (including phosphatic clay salt) was set at 30 cents a ton.

Rates were held down on many farm products.

Spotlight on Mergers

Congressional support and a bigger budget are behind the Federal Trade Commission's search for the pros and cons of business mergers. Congress may not act, however

ANTIMERGER activities will be stepped up. The Federal Trade Commission alone is planning to spend some $1.2 million — about one-fourth of its budget — on merger matters, compared with an estimated $338,000 in fiscal 1956.

The final test of the legality of a merger is the answer to the question: "Is it harmful to competition?" So FTC would like to clear up: 1. How the Clayton Act applies to conglomerate mergers (big companies moving into allied fields in the interest of diversification). 2. How the Clayton Act applies to cases of a major corporation moving into a new territory by buying one or more local firms.

Plans—Another result of a bigger budget will be a study of some 5000 firms to determine their sizes, products, plant locations, selling areas, methods of sale or classes of customers, sales of major products and relative sizes of major markets. "Without this minimal information," says John Gwynne, FTC's chairman, "neither the competitive consequences of mergers in general nor the consequences of particular mergers can be measured or judged critically. With it, potentially significant acquisitions can be readily identified."

Requests—FTC would also like: 1. Prenotification by companies intending to merge with or acquire another firm. (The only way FTC finds such information now is by reading magazines and newspapers.) 2. Power to get an injunction to prevent a merger (and prevent a scrambling of assets before the legality of the merger is decided on).

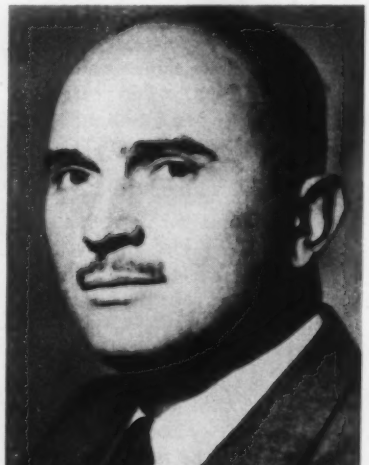
Such legislation is in the hopper. A bill by Sen. John Sparkman (Dem., Ala.), for example, would require advance notice to the attorney general and FTC if either participant has assets of more than $1 million; authorize the FTC to seek preliminary injunctions against mergers; and give FTC jurisdiction if either party is in interstate commerce (the law at present seems to indicate jurisdiction only if both firms are in interstate commerce). Firms involved would be required to furnish "all necessary data" to investigators.

Impact—Similar bills have been introduced in the House. If the $1-million prenotification requirement were adopted, it would affect more than 90 per cent of merging firms (judging from mergers that took place from 1948 to 1954). Similarly, if a talked-about $10-million requirement were enacted, about two-thirds of merging firms would have to report.

The professed aim of such legislation is to protect small firms. But the U. S. Chamber of Commerce says antimerger bills would penalize small business. They could forestall mergers which help competition. Overlapping of jurisdiction could also result.

Objection—A possible objection to prenotification: How about the firm that prenotified; then had its deal nixed by FTC? Would it lose the faith of its customers and suppliers?

Congressional sentiment certainly favors some antimerger action this session. The question seems to be one of time: The legislators will want to leave Washington early to hit the campaign trail and certain "must" issues (roads, schools, etc.) have to be taken up. It could be decided that the antimerger issue can wait.



Meet Roger F. Waindle: He's chief of the Castings Branch, Iron & Steel Division, Business & Defense Services Administration. On loan to the government for six months, he is vice president, Misco Corp., and president, Wai Met Engineering Co. He began his career as an engineering trainee in the foundry of Hoskins Mfg. Co.

BDSA Eyes Rolling Mills

The Metalworking Equipment division, Business & Defense Services Administration, is beginning a study of rolling mill equipment. The aim is to know where we stand in case of an emergency, a question of capacity vs. known and anticipated requirements.

Likely to be brought out is the concentration of builders of such equipment in the Pittsburgh area. Recommendations to come out of the study could advise granting of fast tax amortization to induce firms to disperse any new plants.

Triggers Ready

The government's "trigger" orders for machine tools are about ready to be sent out. General Services Administration has been revising the contract to make it acceptable to both industry and government, a necessity if government is to get the degree of industry co-operation it wants. It's hoped contracts will be executed in three to four months.

The revised contract will have a semiautomatic trigger feature, rather than be fully automatic as originally planned. An automatic trigger could be dangerous because of possible false alarms.

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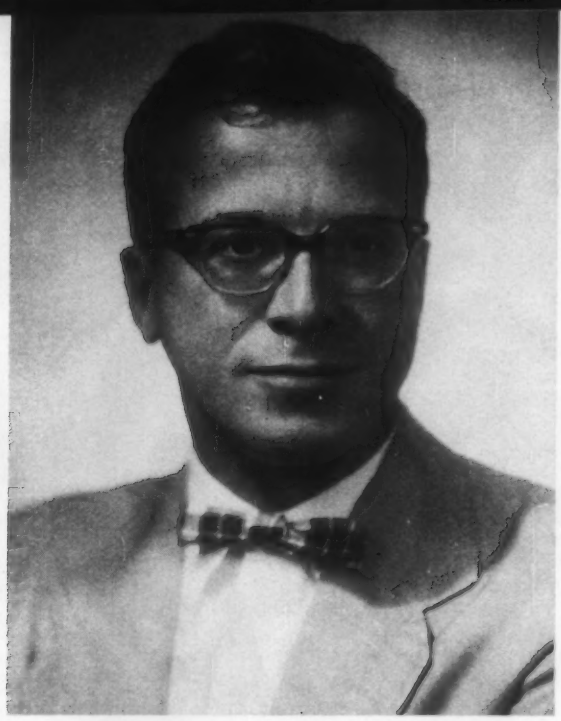
Management at Work



Special Jobs for Specialist Griesinger

FRANK K. GRIESINGER is a specialist at special projects.

Although he carries the title of assistant treasurer at Lincoln Electric Co., Cleveland, his activities carry him into fields which might seem far from finance. He has researched equipment leasing. He became knowledgeable about printing and lithography so his company could establish a duplicating system to reproduce printed matter. He and Leonard Giles, director of personnel, devised new methods for screening office job applicants.

Paradox—The special assignment which has brought Frank Griesinger the most national attention has yet to realize its full potential. He has become an authority on equipment leasing, speaking on the subject before many groups and writing about it in such publications as the *Harvard Business Review, Journal of Taxation,* and STEEL.

When the Internal Revenue Service tightened up on leasing definitions and regulations, many equipment manufacturing companies, including Lincoln, were forced to de-emphasize that marketing device (See STEEL, Nov. 21, p. 52). "But leasing still holds promise of being a great aid, given the right legal and legislative atmosphere," believes Mr. Griesinger. He thinks that right atmosphere will come "in several years."

Reason Why—Mr. Griesinger became his special kind of specialist because "a man with a financial job should try to make the most effective possible use of capital." He thinks: "Medium and large firms need a few people who can range around on a variety of short-term jobs, none of which would merit the services of a man permanently." Most assignments for him have administrative or marketing implications.

The 40-year-old Mr. Griesinger came to Lincoln as soon as he was graduated from Ohio State University in 1938. He became manager of the firm's credit department that same year. On that job, he evolved methods to cut red tape on time payment plans. "I developed some latent sales instincts," he recalls, "by learning how to convince a man that prompt payments improve his credit rating." He won his present title in 1949.

Varied—His outside interests are as various as his professional ones. He, his wife, daughter and three sons are skiing enthusiasts. He is clarinetist in the Cleveland Philharmonic Orchestra, a bell ringer for his church and a member of the Guild of Carilloneurs. He's vice president of the Cleveland Institute of Music, past president of the Cleveland Treasurers' Club.

"I like variety on and off the job," he says. "It helps me keep alert."

New uses for electronic data processing appear as . . .

Bay State Tries Computers

"WE STILL HAVE much to learn about future uses of electronic equipment, but there is no doubt that our acceptance of the electronic computer as a business necessity is here to stay," says Elden L. Auker, sales manager, Bay State Abrasive Products Co., Westboro, Mass.

Current Mission—Using an International Business Machine Corp. card program calculator system, Bay State is compiling abrasive wheel formulas, company payrolls and cost analysis data. Some market analysis is being conducted, too. The company's interest in computers was stimulated when a company official asked: "Could we use an electronic computer to figure out formulas for grinding wheels?"

Rebuttal — Many industry spokesmen said it would be too costly for a smaller manufacturer, even if it could be done. Some predicted that it would be impossible to work out the thousands of variables which enter into abrasive wheel formulas. Result: After months of investigation and research, Bay State, assisted by IBM engineers, discovered that it could produce formulas and offset the rental cost of the equipment by the time saved.

How It Works—Field sales engineers write the specifications. They are forwarded on five-channel tape by Teletype to the home office where the punched tape is converted to IBM cards. The computer writes the order with the salesman's number, customer's name, etc., and makes 160 calculations for each formula. Three orders can be completed in 1 minute.

Regardless of complexity, it takes about 12 seconds to do a formula. Manually, it would take from 5 minutes to several hours. Other advantages: 1. The "overage" calculation necessary in formulating every batch of mix is made more closely. There is less overproduction of wheels on any order, and smaller amounts of mix are returned for reclamation. 2. Order processing time from field sales offices is being slashed from ten days to one. 3. Data on direct labor and raw materials cost are available as a by-product.

Management Sold—With the results beginning to show, Bay State realized that the equipment in use would have limitations. Now on order: IBM's 650 unit which will provide the company with a completely integrated data processing system.

Future horizons: 1. Pricing will be formulated by information stored in the memory unit of the 650 unit. 2. Inventory control will be initiated through a card system in the home and branch offices. 3. Sales and production analysis will be conducted on a broad scale. 4. Invoicing will be a by-product of the original form submitted by the distributor or salesman. 5. Quality control and market analysis will be on a continuous basis.

And—The electronic equipment may stimulate new methods of manufacturing. Example: In the next five years it may be possible to eliminate hand weighing and mixing. Conveyor, weighing and mixing equipment could be controlled by magnetic tape or punched cards which could be cut at the time the orders are placed. When mixed, the materials could be conveyed to barrels for in-process storage or directly into special or automatic presses.

More Steel for Europe

Country	Company	Construction Plans	Estimated Cost
GREAT BRITAIN	Appleby-Frodingham Steel Co.	Replace 120-in. heavy plate mill with 144-in., 4-high mill	$ 9,040,000
	Peech & Tozer	Improve 30-in. mill and plate mill	226,000
	Samuel Fox & Co.	Erect 20-ft electric furnace, replace billet mill with 32-in., 4-high mill	10,735,000
ITALY	Ilva, Piombino	Two new open hearths	4,390,243
	Ilva, Bagnoli	New tube and strip mill	5,365,853
	S. I. A. C.	Increase plate mill width	5,268,292
	F. I A. T.	Build two soaking pits	186,991
LUXEMBOURG	Soc. Miniere et Metallurgique de Rodange	Build mixer, fifth basic bessemer, 25-ton pouring crane, enlarge casting bay	2,300,000
BELGIUM	S. A. Usines Gustave Boel	Overhaul coke ovens, modernize by-product plant	2,450,980
FRANCE	Soc. Metallurgique de Normandie	Sintering plant	333,500
	USINOR, Denain	Increase basic bessemer capacity, convert blooming to slab mill	1,423,000
	USINOR, Valenciennes	Sintering plant	4,000,000
GERMANY	Eisenwerke Muhlheim-Meidereich	Modernize blast furnaces	575,000
	August-Thyssen Hutte	Install fourth blast furnace	812,000
	Huttenwerk Rheinhausen	Erect continuous roughing mill	1,279,166
	F. Meyer, Dinslaken	Build seamless tube mills	830,000
	Mannesmann Huttenwerke Huckingen	Enlarge structural mill soaking pit and improve mill. Improve "800" mill and install cutoff machines for tube rounds	793,748
	Westfalenhutte, Dortmund	Modernize soaking pit, construct strip-mill building, build merchant mill	2,624,996

Four other German companies have announced investment plans which total $1.6 million

STEEL expansion is moving ahead in Western Europe. The latest round announced by member companies of the Organization for European Economic Co-Operation adds up to a $54-million bet on continuing prosperity. Plans were submitted at a Paris meeting earlier this year.

Three big British steel companies pledged some $20 million for current expansion projects. Most are designed to balance their finishing and steelmaking capacities.

The big surprise: Reporting Italian companies say their programs will cost more than $15 million. That's almost twice the size of the expansion announced by German members, and more than French, Belgian and Luxembourg companies together. Italian plans continue the energetic expansion that has been going on since 1951. In the last four years, she has upped steel output to a new high of 6 million tons, a gain of 88 per cent since 1951.

Observers point out that while these are major expansion plans, they are not inclusive. Total European effort in 1956 will be at least proportionate to the rebuilding going on in this country.

Focus on Japan

Steel, shipbuilding, power turbine and auto industries in Japan will get an $8-million shot in the arm from the World Bank, it was announced last month. The loan will finance the import of more than 100 machines and machine tools from the U. S. and other countries.

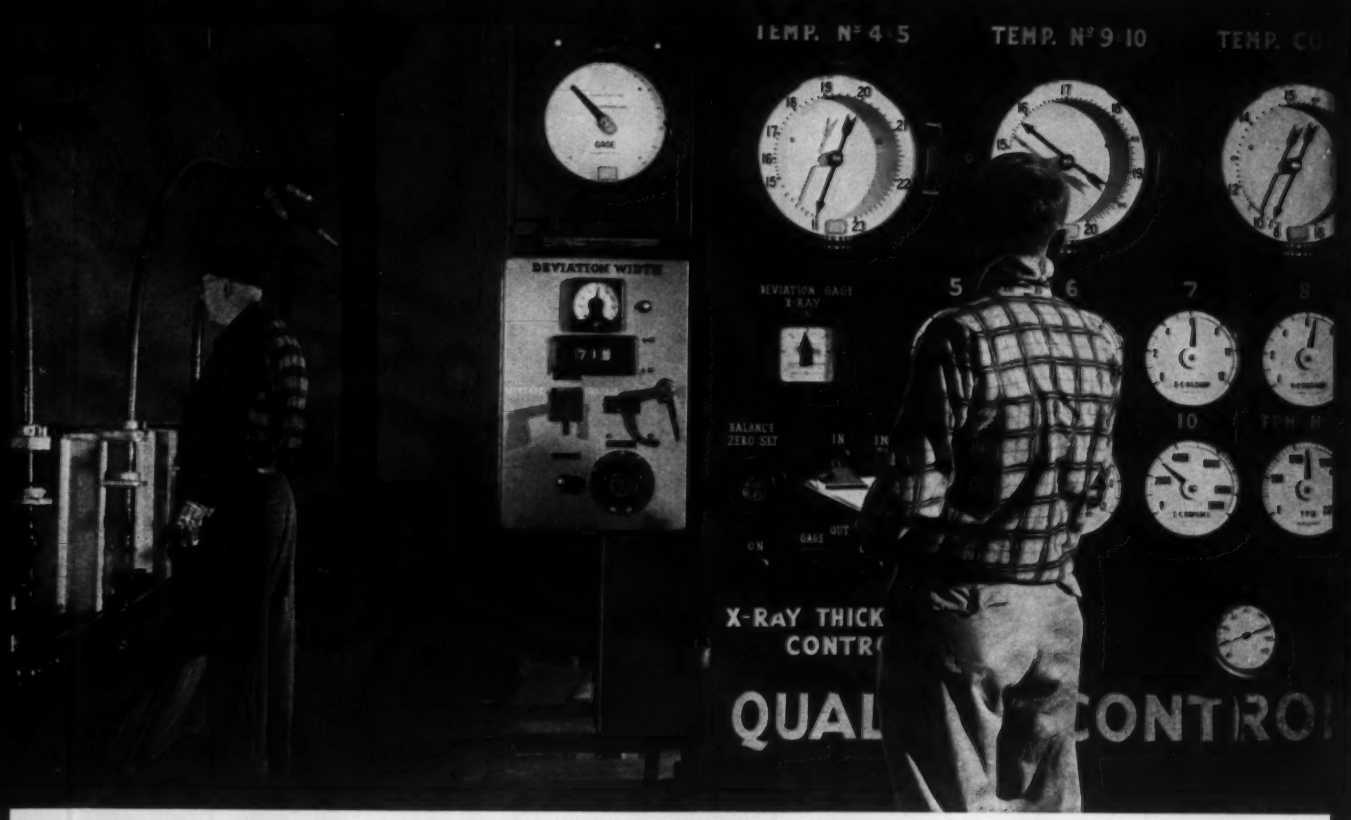
Nippon Steel Tube Co. Ltd., Japan's largest producer of pipe and tube and its third largest steel firm, will spend $11.3 million to replace two obsolete tube mills with one new one.

Mitsubishi Shipbuilding & Engineering Co. Ltd. is retooling to produce heavier marine diesels and a supercharger line. Ishikawajima Heavy Industries Co. Ltd. also is retooling to make high-temperature steam turbines. Toyota Motor Co. Ltd., one of Japan's two biggest auto producers, will use its share to bring truck and bus production lines up to date.

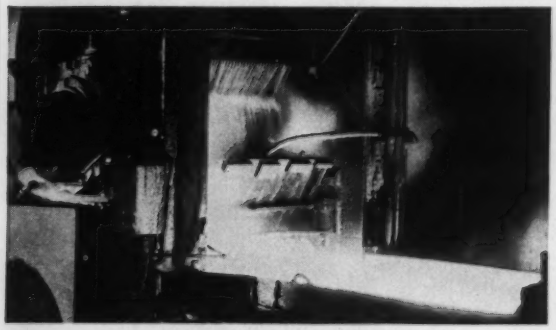
Krupp Builds in Brazil

German Krupp interests, denied their bid to build India's steel expansion when a British company won the contract last month, are coming to South America in their latest move in world trade.

With an initial investment of $6 million, they have started a plant at Sao Paulo, Brazil, to make heavy machinery for the Latin-American market. Plant officials said the first stage of the plant would be to build steam, electric and diesel locomotives. The company hopes to produce for the export market also.



How Great Lakes Steel *guides* quality



FIRST QUALITY CHECK is made at No. 1 Mill Stand. Here, an electronic pyrometer relays the strip's temperature to the panel.

FINAL CHECK in this operation is made at the coiler. From slab to coil, the control panel spells far better quality.

Here's one of several electronic operation panels that take the guesswork out of quality control at Great Lakes. You'll find this one guiding the entire operation of the 96-inch continuous mill.

As the red-hot strip races from roll stand to roll stand and on to the coiler, the temperature, speed, width and thickness of the strip *at each stage* are instantly shown on the panel.

A glance at the panel tells the operator if any adjustments are necessary to assure a finished product of the highest quality—a product that will stand the rigid test of your specifications.

This is further proof that Great Lakes has what it takes—the experience and the very latest equipment—to make your product even better. Our representative is just one telephone call away.

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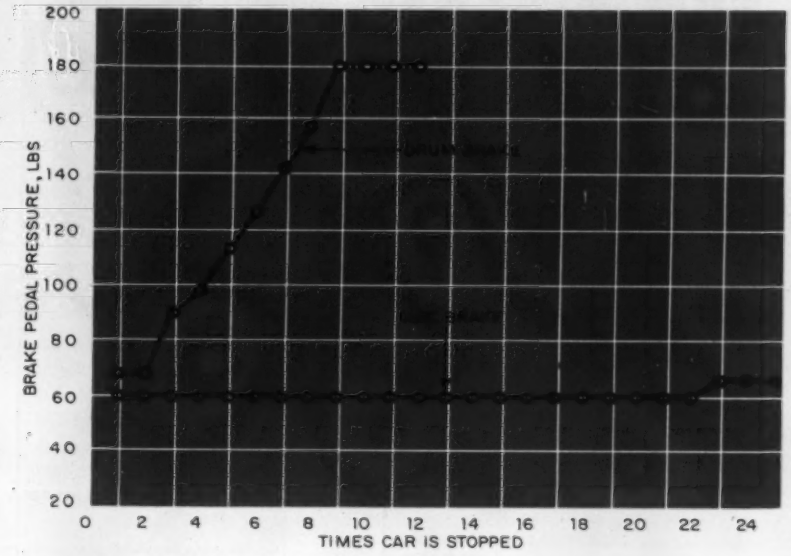

Brake pressure needed to stop car triples after nine stops using drum brake. It stays constant up to 22 stops with the disc brake

Auto Specialties Co.

A Better Way To Stop

High-speed, heavy passenger cars demand safer brakes. That's why engineers are studying the disc type and seeking ways to improve the conventional drum unit

AUTO SPECIALTIES Mfg. Co., St. Joseph, Mich., says its automotive double-disc brake can be produced as economically as some brakes already on passenger cars.

Diecasting of parts is the big reason behind lower production costs, the AUSCO people claim. The company doesn't quote any figures, but it's no secret that cost has been a big factor in not adopting them before. AUSCO's mechanical double-disc brake has proved successful on most tractors, road machinery and aircraft. The same brake, operated hydraulically, is what the company would like to see on 1958 passenger cars.

Too Late—Chances are it won't be seen on '57 automobiles, although several automakers have shown an interest in it. There's still a possibility that some sports car builder may want them for next year's model. That's about all the production the company could handle now. The brakes still are on an experimental production basis. Company spokesmen assert they aren't going to tool up until they get a firm order.

Why hasn't the brake been adopted? Automotive engineers admit it's good. It may be one of the best.

Competition — Auto companies are working hard to develop better brakes. Engineers frankly say that designs are barely adequate for today's heavy cars and high speed engines. They are coming closer, however, and, so far, the industry hasn't seen any reason to buy outside—even at comparable costs. Quite likely they won't for some time to come. Brake engineers have too many problems facing them to rely on one design.

Control—Few realize that the only thing that really controls an automobile is its contact with the ground—four wheels. Brakes which don't hold will cause a driver to lose control of the car's forward motion. Brakes which hold too well and lock, can make a car veer out of control or stop too quickly.

Automobile weight, speed and friction are the factors which give brake engineers nightmares. The heavier a car is and the faster it goes, the more energy it take to stop it.

Repeated stops at high speeds build up frictional heat. Brake drums get so hot they expand to a point where the brake shoe and lining can't make good contact with the drum. When this happens, brakes won't hold. This is called fade. It has been a real menace to sports car and racing drivers, although it isn't quite so serious for the average motorist whose brakes get a chance to cool off between use.

Theory — A conventional brake consists of a drum, brake shoes and shoe linings and one or more hydraulic actuating mechanisms. The lining is riveted or bonded on the shoes which are anchored at one end. When the brake pedal is pressed, hydraulic pressure pushes against the unhinged ends of the shoes, forcing the lining against the brake drum. The car stops.

That's the theory. Obviously, it doesn't work that simply. Modern drum brakes are more complicated, and there are many variations. Among the never-ending problems are better brake linings, positive hydraulic mechanisms and self-adjusting units to compensate for wear. Two of the most recent advances on 1956 passenger cars are Chrysler's Center-Plane brake and Studebaker's finned brake drum.

Center-Plane—The biggest dif-

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ference in Chrysler's brake is that the shoes are free floating. They rest against anchor blocks, but are not fastened to them. The shoes still are actuated by hydraulic pressure, but being free floating, the centrifugal force of the revolving brake drum pushes the shoes against the anchor blocks and forces them into tighter contact with the drum. This offers more uniform pressure and reduces fade, since it automatically compensates for expansion caused by frictional heat. Center-Plane brakes are available on DeSoto, Chrysler, Imperial and Crown Imperial cars.

Fins—Another and simpler way of beating the heat is found on 1956 Studebaker Presidents and the Hawk series. The outer edge of the brake drum is finned to give greater cooling surface and better air circulation. Since the fins are not vented and heat develops inside the drum, it's a little difficult to say just how much heat transfer is provided by this additional finned surface. Studebaker claims the finned drums will give 100-per-cent-faster cooling.

These improvements and others on the way, still are modifications of the drum and shoe brake. The double-disc brake developed by Auto Specialties is a completely different design, although the basic theory of applying frictional stopping pressure against a drum hasn't changed.

Double-Disc—The AUSCO brake (formerly the AUSCO-Lambert) consists of four aluminum discs. Two outer discs are lined with gray iron facing plates cast into the discs. The brake lining is bonded to the two inner or actuator discs which are separated by seven steel balls, each seated in a conical bearing ramp.

In operation, hydraulic pressure rotates the inner discs apart, allowing the steel balls to slide up their ramps. The lined, actuating discs are pressed against the facing plates of the outer discs, bringing about a smooth, steady stopping action.

Since the steel balls act as wedges, they continue to push the inner discs against the facing plates even though lining is worn or frictional heat causes the outer discs to expand.

This sliding pressure, plus the fact that aluminum radiates heat better than cast iron, causes AUSCO engineers to claim that the brake has about eliminated fade (see chart). A screw adjusting mechanism automatically compensates for lining wear.

With the exception of the steel balls and gray iron facing plates, all major parts of the AUSCO brake are of die-cast aluminum. This replaces expensive forging and machining operations which had boosted the original cost of the brake over other models.

Roundup — Stopping isn't a simple problem. These are only a few of the designs and developments which are being used and tested. Frictional heat still makes engineers wince. The 14-in. wheels coming out on many 1957 automobiles mean smaller braking surfaces will have to do the job larger surfaces are handling now.

As more automobiles crowd onto the highways and as vehicle speeds increase, automakers continue to search feverishly for safe, positive stopping devices. They won't overlook any bets.

U. S. Auto Output

Passenger Only

	1956	1955
January	611,190†	659,508
February		675,769
March		794,188
April		754,007
May		724,891
June		649,372
July		659,979
August		614,392
September		461,592
October		517,669
November		748,559
December		682,698
Total		7,933,369

Week Ended	1956	1955
Feb. 4	140,582	164,265
Feb. 11	136,308	168,059
Feb. 18	128,324	173,482
Feb. 25	125,502	171,188
Mar. 3	133,613†	167,811
Mar. 10	130,000*	171,346

Source: *Ward's Automotive Reports*
†Preliminary *Estimated by STEEL

Hard Tops Poll Second Place

Hard tops and station wagons set 1955 popularity records, says the Automobile Manufacturers Association.

Hard tops hit second place (four-door sedans are first) with factory sales of 2.2 million, a 10-point increase over the 17 per cent of sales captured in 1954. Station wagon sales totaled 759,422, compared with 1954's 349,450.

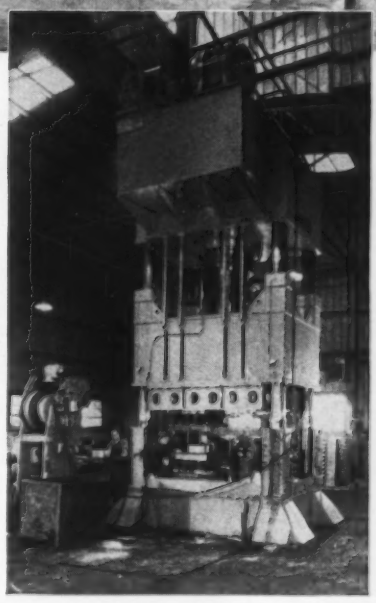
In 1950, the hard top body style accounted for only 4 per cent of new car sales. Station wagon sales have increased some 840 per cent during the postwar period, AMA reports.

Most people know that the resale value of a car depends partly on its style. That's one reason why both hard tops and station wagons will continue to gain popularity. Current indications are that hard tops may well capture 35 per cent of 1956 factory sales; station wagons could take 15 per cent, compared with last year's 9.6 per cent.

Exhaust Notes

Operation Manpower is the largest retail salesmen's training program ever undertaken in the automobile industry, says C. E. Briggs, vice president of sales, Chrysler Corp., Detroit. The program seeks to recruit and train some 5000 retail salesmen for Chrysler dealerships. . . . Since Mar. 7, those who buy a 1956 Rambler, Nash, Hudson or Metropolitan are eligible for a free $25,000 automobile accident insurance policy against personal injury. With AMC's unit body construction, that looks like a safe bet. . . . Herbert L. Misch, chief engineer, Packard-Clipper division of that corporation, says that customers are showing greater interest in engineering features. Surveys on the Packard Predictor indicate that 78.2 per cent of the opinions are on engineering developments. . . . General Motors auto sales through Feb. 20 were 98 per cent of the comparable period last year. . . . Reduced driver fatigue and improved vehicle performance can result from the wide-range, one-shift axle introduced on '56 GM trucks, say Truck & Coach division officials.

This Verson line-up cuts costs on double sump sinks



● The press line illustrated above, part of the final operations in forming double sump sink units before porcelain enamelling, includes Verson eccentric, hydraulic and crank presses. Previous operations on the sinks include deep drawing the sumps to a depth of 7⅜" from 14 gauge Armco deep drawing stock on a 1000 ton Verson hydraulic press and piercing and embossing the center drain hole in the sinks on a Verson O.B.I. Both of these presses are shown at the right.

This is more than just a line-up of Verson presses . . . it's a production process engineered by Verson to cut costs as an integrated part of the complete manufacturing program. Verson has the experience and facilities to meet the most exacting press requirements . . . and the "know how" to blend these presses into an efficient and practical production process.

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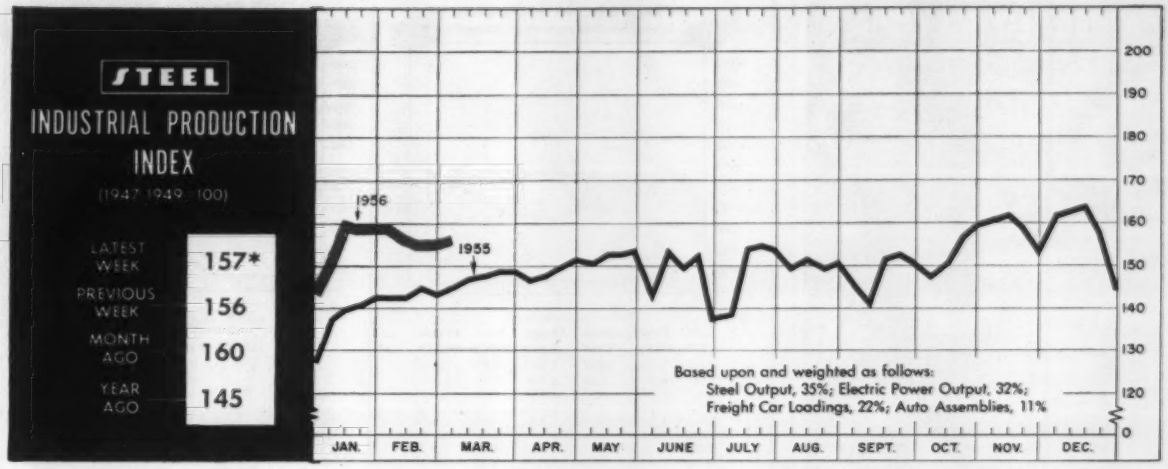

*Week ended Mar. 3

Annual Reports Spread Business Cheer

IT'S OPEN SEASON for annual reports, and if you read many of them coming from the nation's metalworking industry, you can't help but feel confident about business prospects for 1956.

In a typical day's mail, STEEL tallied the outlook score for 15 companies in varied segments of the industry. Score: Six anticipate better things this year; nine are confident of "another good year" or a year "ranking among the best"; none expects any serious decline.

Typical—The main brake against accelerating business still seems to be materials shortages. This is especially true of the nonferrous companies. F. L. Riggin Sr., president of Mueller Brass Co., says that although both copper and aluminum are still in short supply, "there are indications that both materials will become more available later in 1956, although prices will probably remain high." R. S. Reynolds Jr., president of Reynolds Metals Co., says: "The year 1956 begins on a note of optimism. Availability of metal continues, however, to be a limiting factor in our industry."

Aside from that, backlogs indicate high-level operations for most of 1956 for many companies. Babcock & Wilcox Co. had unfilled orders worth $213.5 million on Jan. 1, 1956, compared with $129.5 million at the beginning of 1955. Link-Belt Co.'s backlog is about 50 per cent higher than last year's. Farrel-Birmingham Co. Inc. had a backlog of $39.5 million on Jan. 1, a 58-per-cent gain over the year before. Mesta Machine Co.'s backlog of $91.4 million was treble that of a year ago for the largest figure in the company's history. "With additional orders that can reasonably be expected," says Lorenz Iversen, president of Mesta, "satisfactory operations should continue not only through the current year but for 1957 as well." Robert F. Black, chairman and president of White Motor Co., reports a backlog worth $45 million and feels

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)[2]	2,422[1]	2,459	2,241
Electric Power Distributed (million kw-hr)	11,270[1]	11,277	9,727
Bitum. Coal Output (1000 tons)	9,975	10,090	8,760
Petroleum Production (daily avg—1000 bbl)	7,100[1]	7,183	6,806
Construction Volume (*ENR*—millions)	$355.7	$440.1	$373.2
Auto, Truck Output, U. S., Canada (*Ward's*)	168,971	156,258	192,892
TRADE			
Freight Car Loadings (1000 cars)	690[1]	687	659
Business Failures (Dun & Bradstreet)	235[1]	230	222
Currency in Circulation (millions)[3]	$30,180	$30,210	$29,776
Dept. Store Sales (changes from year ago)[4]	+4%	+6%	+3%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$21,715	$18,595	$21,460
Federal Gross Debt (billions)	$280.0	$279.7	$278.2
Bond Volume, NYSE (millions)	$19.6	$17.5	$22.8
Stocks Sales, NYSE (thousands of shares)	14,177	10,568	14,949
Loans and Investments (billions)[4]	$84.0	$84.3	$84.3
U. S. Govt. Obligations Held (billions)[4]	$28.4	$28.5	$34.8
PRICES			
STEEL's Finished Steel Price Index[5]	209.10	209.10	194.53
STEEL's Nonferrous Metal Price Index[6]	276.9	279.4	227.2
All Commodities[7]	112.1	112.0	110.1
Commodities Other Than Farm & Foods[7]	120.4	120.2	115.3

*Dates on request. [1]Preliminary. [2]Weekly capacities, net tons: 1956, 2,461,893; 1955, 2,413,278. [3]Federal Reserve Board. [4]Member banks, Federal Reserve System. [5]1935-1939=100. [6]1936-1939=100. [7]Bureau of Labor Statistics Index, 1947-1949=100

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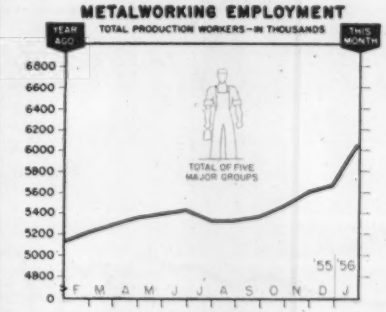
THE BUSINESS TREND

METALWORKING EMPLOYMENT

TOTAL PRODUCTION WORKERS—IN THOUSANDS

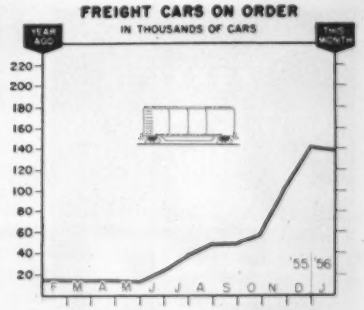


1955	Prim. Mtls.	Fab. Prod.	Mach-inery	Elec. Mchy.	Trans. Equip.
Jan.	1,013	834	1,109	800	1,400
Feb.	1,032	844	1,125	803	1,426
Mar.	1,057	860	1,144	803	1,447
Apr.	1,076	868	1,164	804	1,462
May	1,096	877	1,174	809	1,456
June	1,115	884	1,182	816	1,447
July	1,098	863	1,160	802	1,420
Aug.	1,112	877	1,155	818	1,379
Sept.	1,134	894	1,149	855	1,357
Oct.	1,135	904	1,194	885	1,378
Nov.	1,151	912	1,213	870	1,484
Dec.*	1,162	906	1,237	874	1,514
1956					
Jan.*	1,600	895	1,244	854	1,496

*Preliminary
U. S. Bureau of Labor Statistics

FREIGHT CARS ON ORDER

IN THOUSANDS OF CARS



	Awards		Backlogs (end of month)	
	1956	1955	1956	1955
Jan.	1,818	5,087	144,946	18,395
Feb.	....	2,690	.....	18,633
Mar.	....	2,156	.....	17,974
Apr.	....	2,706	.....	17,930
May	....	3,041	.....	16,886
June	....	13,365	.....	27,102
July	....	18,007	.....	42,888
Aug.	....	13,405	.....	52,803
Sept.	....	3,228	.....	52,913
Oct.	....	12,843	.....	61,954
Nov.	....	51,066	.....	109,370
Dec.	....	42,278	.....	147,320
Total	....	169,872		

American Railway Car Institute

Charts copyrighted, 1956, STEEL

that "sales volume in 1956 may well exceed 1955's record-breaking figure."

Optimism Boosts Index

This business confidence is one of the prime factors in keeping industrial activities at near-peak levels. STEEL's industrial production index registered a preliminary mark of 157 for the week ended Mar. 3 (1947-1949=100). That's up a point from the previous week. Last year did not reach that level until the week ended Oct. 22, and since that time, the trend has fluctuated within the narrow margin of 8 percentage points, with the exception of holiday - shortened weeks. This is proof of the high, stable level of business that has prevailed for the last five months.

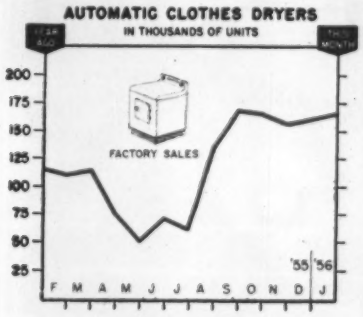
All four elements of the index contributed to the slight upward movement. Electric power generated continued to hold above the 11-billion-kw-hr mark for the eighth consecutive week. The week ended Feb. 25, at 11.277 billion kw-hr, was 16 per cent ahead of the corresponding week last year. The important central industrial district continued to lead other areas, with an advantage of 25 per cent over the same 1955 week.

Steel production roared to its second best week, with an output of 2,459,000 net tons for ingots and castings in the week ended Mar. 4. The American Iron & Steel Institute predicted 2,422,000 net tons for the week ended Mar. 11. Not since the last week in 1955 has the steel industry failed to produce more than 2.4 million tons a week.

Railroad loadings of revenue freight during the week ended Feb. 25 slipped to 687,018 cars, down 11,301 from the preceding week. But the former period was affected by Washington's birthday. At that, loadings were still 8.9 per cent above the 1955 week.

Automotive Snaps Back

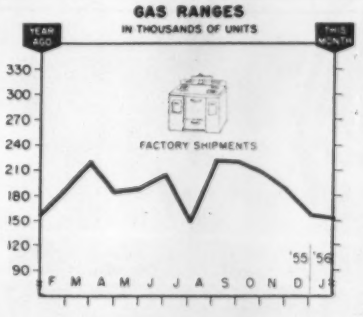
The biggest boost for the index came from the automotive industry. Production for the week ended Mar. 3 amounted to 159,020 cars and trucks, compared with 148,175 the previous week. This was the best showing since the first week in February and was the result of increasing signs of a spring pickup in sales. Originally estimated at about 510,000 new car sales, February could well end up closer to 520,000 units. *Ward's Automotive Reports* says manufac-



Factory Sales—Units

	1956	1955	1954
Jan.	166,243	115,383	82,195
Feb.	.....	109,215	62,488
Mar.	.....	113,498	51,796
Apr.	.....	73,978	37,661
May	.....	49,228	26,533
June	.....	70,616	30,297
July	.....	60,516	40,755
Aug.	.....	136,190	80,165
Sept.	.....	169,905	107,084
Oct.	.....	166,889	122,182
Nov.	.....	157,153	138,254
Dec.	.....	161,823	115,341
Totals	.....	1,384,394	897,751

American Home Laundry Mfrs. Assn.



Shipments—Units

	1956	1955	1954
Jan.	150,000*	152,900	137,000
Feb.	.....	186,200	152,900
Mar.	.....	217,300	188,200
Apr.	.....	182,300	172,400
May	.....	187,400	163,800
June	.....	203,900	174,300
July	.....	145,700	134,500
Aug.	.....	218,600	179,400
Sept.	.....	217,700	203,900
Oct.	.....	207,800	197,100
Nov.	.....	183,000	174,000
Dec.	.....	154,300*	147,300
Total	.....	2,257,100*	2,024,800

*Preliminary
Gas Appliance Mfrs. Assn.

turers are aiming for production of 610,800 units in March, a 10-percent gain over February. This would make first-quarter production the second best first quarter in the industry's history.

But with still record-high inventories in dealers' hands, *Ward's* says the industry is expected to meet the demands of spring and summer buying more from existing inventories than from any widespread production increase. Second-quarter production may be on a level comparable with first quarter.

Reports Bolster Outlook

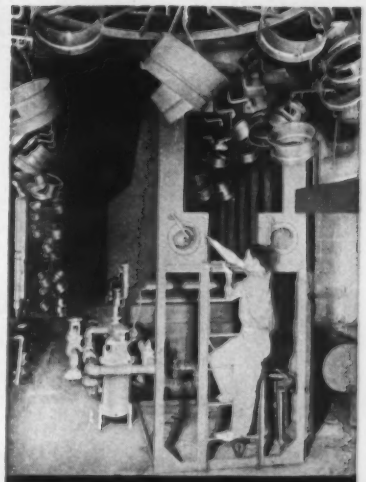
Reports from various industry associations confirm the good business prospects for 1956. The American Gear Manufacturers Association's sales index for January was 245.5 (1947-1949=100). This was the second consecutive month at that level and compares with 140.9 in January, 1955.

Unfilled orders for fabricated structural steel in January stood at the highest level since August, 1953. About half the 2,406,609 tons was scheduled for fabrication during February, March, April and May. January bookings of 405,263 tons represented an all-time monthly high, reports the American Institute of Steel Construction. That's 68 per cent above January, 1955. Shipments for January were 250,155 tons, slightly above the December level.

Home appliances are doing all right, too. Indicative is factory sales of 564,923 home laundry units sold in January. This was the second best month in the industry's history, says the American Home Laundry Manufacturers' Association. And factory sales of standard-size household vacuum cleaners in January continued the record-breaking pace they have maintained since August, 1954, with 302,203 units. Each month's sales during that period have exceeded the record for that month. January's total was 21.4 per cent above the old January record.

Construction Holds High Level

Construction still holds the spotlight in view of its record-breaking pace through nine weeks of 1956. *Engineering-News Record* reports heavy construction awards worth $355.7 million for the four-day week ended Mar. 1. This brings the cumulative total this year to $3,729.7 million, 35 per cent ahead of the similar period last year.



...new Cincinnati Finishing System at *NuTone*

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4. **Available in hand or motor operated models.**
5. **Unlimited capacities.**
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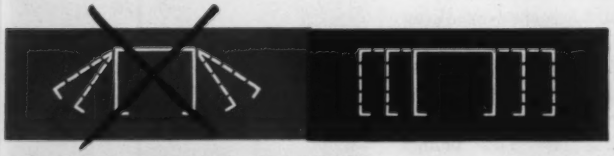
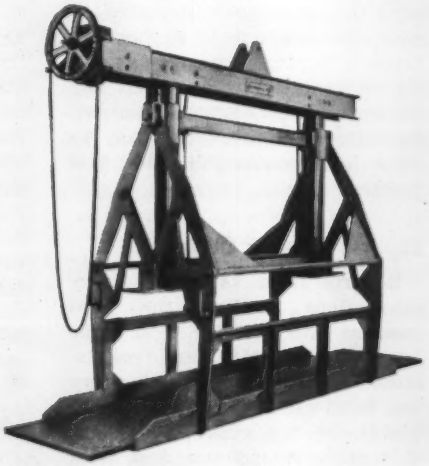
7. **Designed to fit any crane block and hook equipment.**



STRAIGHT LINE MOTION OF GRABS. There is no up and down arc . . . vertical members remain vertical and the lifting angle moves in and out parallel to the floor. This action greatly reduces the possibility of damage to the sheets.



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EUGENE C. CLARKE JR.
. . . heads Chambersburg Engineering

RICHARD C. AYLWARD
. . . Bohn Aluminum gen. sales mgr.

A. K. Rheem, for the last two years vice president-sales, **Cowles Tool Co.**, Cleveland, was elected president to succeed **C. W. Sollenberger,** now chairman of the board. Mr. Rheem previously was with Rheem Mfg. Co. for 21 years, becoming sales manager, hot water heater division.

David G. Woodward was named manager of production at the Ambridge, Pa., plant of **National Electric Products Corp.** He succeeds **Frank O'Brien,** recently named works manager. Mr. Woodward formerly was with McLain Firebrick Division, H. K. Porter Company Inc., and United States Steel Corp.

William F. Fritz was made plant superintendent, **Boye & Emmes Machine Tool Co.**, Cincinnati. He was chief engineer of Acme Machine Tool Co. and plant superintendent of Leyman Corp.

Frank E. Harper was made plant manager in charge of manufacturing at **B. F. Goodrich Co.'s** tire and equipment division, Los Angeles.

Richard L. Erlin was made general sales manager of **Kaiser Steel Corp.'s** fabricating division plants at Napa and Fontana, Calif. He was engineering sales manager at Oakland, Calif., and is succeeded by **Elvan R. Babylon.**

Eugene C. Clarke Jr. was elected president of **Chambersburg Engineering Co.**, Chambersburg, Pa. He was general manager. Mr. Clarke succeeds his father, who is retiring from active management but continues as a director.

Jack K. Sutter was appointed sales manager of standard pipe products for **National Supply Co.**, Pittsburgh. He succeeds **C. J. Ramsburg Jr.** who was promoted to manager of tubular sales. Mr. Sutter was Pittsburgh district manager.

Safway Steel Products Inc. appointed **Arnold T. Hoenke** works manager and **Arvid A. Anderson** operations manager. Mr. Hoenke was chief industrial engineer at Pressed Steel Tank Co. Mr. Anderson, formerly plant superintendent, will control operating functions at the Milwaukee and Rochester, Ind., plants.

Forrest W. Johnson was named quality supervisor and **Gordon W. Reeder** plant metallurgist at **American Welding & Mfg. Co.**, Warren, O.

D. R. Waugh was made assistant director of market development, **United States Steel Corp.**, Pittsburgh. He was made manager of heavy products and sheet second sales and became general sales staff manager in November, 1951.

Richard C. Aylward was made general sales manager, **Bohn Aluminum & Brass Corp.**, Detroit. He was midwest regional manager at Chicago.

Joseph Dixon Crucible Co., Jersey City, N. J., appointed **R. C. Brock** general sales manager; **David C. McMillin,** assistant general sales manager; **A. G. Fletcher,** western district manager; **Harry I. Goecker,** director of purchases; and **E. M. Strom,** assistant product manager, graphite and lubricants division.

Roy H. Heldenbrand was made divisional manager of **Threadwell Tap & Die Co.**, Greenfield, Mass., subsidiary of **Sheffield Corp.**, Dayton, O. He succeeds **Paul W. Polk,** who transfers to Dayton as executive vice president of Sheffield.

John S. DeNoia was made automotive sales manager for **Permacel Tape Corp.**, New Brunswick, N. J.

Herbert Wolf was made chief engineer of **Worthington Corp.'s** air conditioning and refrigeration division research and development. He continues headquarters at the Harrison, N. J., division until the air conditioning - refrigeration division moves to its new plant at Ampere, East Orange, N. J.

F. W. Schroeder joined **North American Refractories Co.**, Cleve-

ROBERT S. GROVER
. . . president of Apex Steel

land, as associated director of research.

Apex Steel Corp. Ltd., Los Angeles, elected **Earle V. Grover** chairman; **Robert S. Grover**, president and treasurer; and **D. L. Robertson** and **B. W. Thorne Jr.**, vice presidents.

S. A. McFarland Jr. was made assistant manager, stainless steel sales, **United States Steel Corp.**, Pittsburgh. He was assistant to manager, stainless steel sales.

Hancock Steel Co. Inc., Detroit, elected **Larry Gannes** vice president-sales to succeed **Vernon A. Peters**, now executive vice president.

C. Richard Sword was made sales manager at **Aerovent Fan Co. Inc.**, Piqua, O., to succeed **James F. Tilton**, resigned.

Robert W. Jones was made chief development engineer, marine division, **Fageol Products Co.**, Kent, O.

Merton C. Grilley, factory manager of **Producto Machine Co.**, Bridgeport, Conn., was elected vice president.

Hays Corp., Michigan City, Ind., appointed **Frederick M. Rutledge** chief control engineer and **Crayton H. Schwestka** chief design engineer.

Edward L. Baumann was made New York regional manager of **Bettinger Corp.**

NORMAN W. CALKINS
. . . Universal-Cyclops sales post

Norman W. Calkins was made manager of tool steel sales for **Universal-Cyclops Steel Corp.** He was assistant manager. He makes his headquarters at the Cyclops Division, Titusville, Pa.

Stuart F. Hatch was made Pittsburgh district manager, **Spang-Chalfant Division**, National Supply Co. He is succeeded by **Robert L. Gore** as district manager at St. Louis.

William I. Matthes fills the new post of executive vice president, **Arwood Precision Casting Corp.**, Brooklyn, N. Y. Associated with Arwood for 11 years, he has

WILLIAM I. MATTHES
. . . Arwood Precision Casting post

JOHN A. RINEK
. . . Heli-Coil gen. sales mgr.

served as secretary, vice president-sales and vice president-operations.

John A. Rinek was made general sales manager of **Heli-Coil Corp.**, Danbury, Conn. He will co-ordinate sales in the original equipment and repair markets. Mr. Rinek was with Avery Drilling Machine Co.

Robert Dickey III was made manager of marine sales at **Dravo Corp.**, Pittsburgh. He was assistant to the sales manager, engineering works division.

Ralph H. Vacca was made manager, electronics development section, **National Research Corp.**, Newton Highlands, Mass.

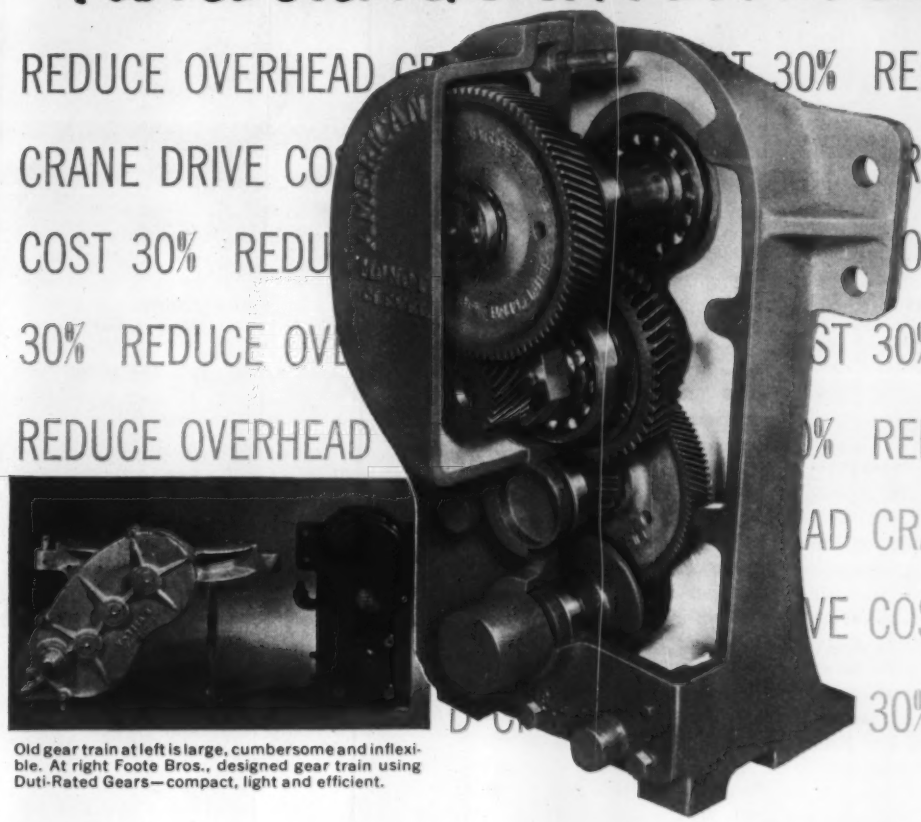
George F. Dun was named assistant general manager, **Standard-Knapp Division**, Emhart Mfg. Co., Portland, Conn. He was general factory administrator of P. R. Mallory & Co.

F. H. McGraw & Co., New York, elected **Paul F. Pape** and **Charles DuBose** vice presidents. Mr. Pape will be in charge of engineering. Mr. DuBose will supervise operations of the firm's Canadian subsidiary in Toronto, Canada.

Myron W. Rhoten was named managing director of **Allis-Chalmers Great Britain Ltd.**, subsidiary of Allis-Chalmers Mfg. Co., with headquarters in Essendine, England. He was European territory sales manager for Allis-Chalmers Mfg.

Duti-Rated Lifetime Gears

REDUCE OVERHEAD CRANE DRIVE COST 30%



Old gear train at left is large, cumbersome and inflexible. At right Foote Bros., designed gear train using Duti-Rated Gears—compact, light and efficient.

100% more capacity - 25% less weight - 28% less size

Ordinary commercial gearing in the traversing drive for an overhead, traveling crane system was bulky and had to be set at a space wasting 45° angle to save head room. Foote Bros. designed a special transmission system using Lifetime Duti-Rated Gears, permitting the application of smaller gears for the same capacity, allowing shorter center distances and a much more compactly designed drive.

The savings in space not only improved the design and performance of the overhead crane but also life expectancy. Maintenance requirements were greatly reduced. An outstanding feature of the new drive was that the Duti-Rated Gears could be interchanged on the same centers to change the ratios . . . allowing various speeds, fast and slow, for traversing.

This is only one example of what Duti-Rated Gears are doing in industry today. Extra gear capacity in less space . . . with longer life and lower costs . . . could be important to you, too. Call Foote Bros. today and learn all the advantages of Duti-Rated Lifetime Gearing . . . pre-engineered as standard or designed for your application. *FREE! Foote Bros. Engineering Manual "Duti-Rated Lifetime Gearing". Write for your copy today!*

This trademark stands for the finest industrial gearing made!

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Better Power Transmission Through Better Gears

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4545 South Western Blvd., Dept. X, Chicago 9, Ill.

HAROLD E. COLLINS
. . . Metals Disintegrating v. p.-sales

H. JOHN McGAFFIGAN
. . . directs Beaird machine products sales

ROBERT POTTER
. . . E. W. Bliss president

Co., tractor group, at the home office in Milwaukee.

Harold E. Collins was elected vice president-sales, **Metals Disintegrating Co. Inc.**, Elizabeth, N. J. A vice president since 1953, Mr. Collins was in charge of sales of the metal pigment and metal abrasive divisions. In addition to his new post, he will manage marketing activities for products of the firm's west coast alloys division.

American Can Co. named **Garnett A. Vaughan** manager of its Hillside, N. J., plant; **James Walker**, manager, St. Louis plant; and **C. E. McCloskey**, manager, Arlington, Tex., plant.

Bruce W. Markey was made Shalco service manager for **Shallway Corp.**, Connellsville, Pa.

H. John McGaffigan was named sales manager, machine products division, **J. B. Beaird Co. Inc.**, Shreveport, La. He was manager of industrial engine sales for Lycoming Division, Avco Mfg. Corp.

J. W. Snavely was made assistant manager and **B. G. Schneider** chief engineer in the conveyor and process equipment division of **Chain Belt Co.**, Milwaukee.

Donald E. Malcom was made supervisor of methods and standards for **Trailmobile Inc.'s** Cincinnati plant.

Ralph E. Walters was made assistant to the president of **Dashew Business Machines Inc.**, Culver City, Calif. He will direct east coast military and industrial sales engineering, with headquarters in Washington.

Robert Potter, an executive vice president, was elected president and chief administrative officer of **E. W. Bliss Co.**, Canton, O. He also was elected a director and member of the executive committee. **Howard U. Herrick**, former president, was elected to the new post of chairman of the board and will serve as chief policy officer. **J. H. Tredinnick** has resigned as an executive vice president, director and member of the executive committee but remains as a vice president and a consultant to the president.

R. L. Bobo was made manager of **Federal Pacific Electric Co.'s** regional plant at Cleveland. He continues as Great Lakes regional sales manager. He joined Federal Pacific in March, 1954.

OBITUARIES . . .

F. J. Pohlmeyer, 60, chief metallurgist, **National Broach & Machine Co.**, Detroit, died Feb. 20.

Stanley A. Bevin, 70, president and treasurer, **Bevin Bros. Mfg. Co.**, East Hampton, Conn., died Feb. 21.

John M. Meyers, 61, president, **United Aircraft Products Inc.**, Dayton, O., died Feb. 18 in New York.

Edward J. Walsh, production manager, **Adirondack Foundries & Steel Inc.**, Watervliet, N. Y., died Feb. 22.

O. Pomeroy Robinson Jr., 64, senior vice president of **General Dynamics Corp.**, Groton, Conn., died Feb. 27.

William J. Harper, 62, who retired in January as chief combustion engineer of **Republic Steel Corp.**, Cleveland, died Mar. 2.

John M. Sylvester, 65, general manager of **Bethlehem Steel Co.'s** main plant, Bethlehem, Pa., died Feb. 27.

William C. Coulter, 77, president, **Coulter Brass & Copper Co.**, Toronto, Canada, died Feb. 23.

Charles Krepps, 56, superintendent, cold drawn department, **Pittsburgh Steel Co.**, at Allenport, Pa., died Feb. 20.

Harry H. Kurtz, 67, president, **Peninsular Steel Co.**, Cleveland, died Mar. 2.

Charles M. Brennan, 75, former president, **New Haven Malleable Iron Co.**, New Haven, Conn., died Feb. 26 in Florida.

J. H. Van Deventer, 74, former editor of *Iron Age*, died Mar. 5 at Brewster, N. Y.

Your Problems Are Ours

NIAGARA FALLS, N. Y.

CHARLESTON, S. C.

CALVERT CITY, KY.

Pittsburgh Met works hand in hand with the steel industry to improve its present products and to develop new methods and alloys which are better suited to the industry's needs. An experimental unit at Charleston is continually in operation in this research.

We realize the cost of alloys has a definite bearing upon the cost of producing steel and, for that reason, we employ and utilize the services of persons who have received their training in the steel industry. By this method we have been unusually successful in effecting cost savings by the steel manufacturers and also in developing and perfecting new alloys which do the job better.

The development and introduction of medium carbon ferrochromium to the steel industry as a substitute for the more expensive low carbon ferrochromium is a definite example of this cooperation.

Medium Carbon Ferrochromium

This is an alloy of chromium and iron containing 60-65% chromium and 2.50-3.00% carbon. This medium grade of ferrochromium is well suited for use in the manufacture of stainless steels, permitting very large additions of chromium without excessive carbon additions. This alloy is available in lump size, ranging from 4" up to 75 pounds and in crushed and screen sizes ranging from 4" to 20 mesh.

Other Cost-Reducing Alloys

High Carbon Ferrochrome
Low Carbon Ferrochrome Silicon
80-90% and 90-95% Ferrosilicon
65% Ferrosilicon Low Impurity Grade
50% Ferrosilicon
Electric Furnace High Silicon Pig Iron

Manufactured at Niagara Falls, Charleston and Calvert City plants, strategically located to serve you promptly via rail and water transportation and also by motor freight.

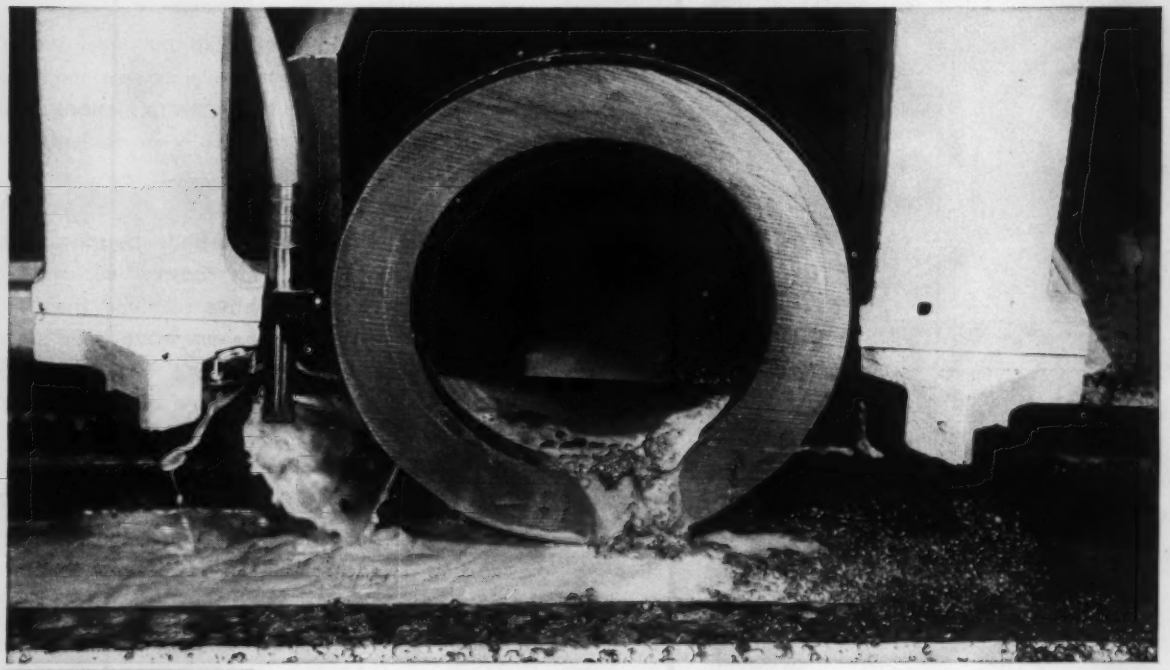
Pittsburgh Metallurgical Company, Inc.

NIAGARA FALLS CHICAGO

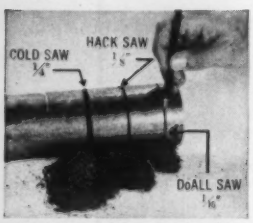
SALES OFFICES

CLEVELAND DETROIT PITTSBURGH

New Saw Bands of High Speed Steel Outperform All Previous Cut-off Tools!



Fast, Continuous Cutting — this new saw band slices through metal at rates up to 14 sq. in. per minute on mild steels.



Big Material Savings — thin band eliminates excessive stock waste, pays for itself in the savings!

DoALL Demon® Blades Cut Cut-off Costs 50% and More!

Never before could you cut so fast at so low a cost as with new DoALL Demon Saw Bands of *High-Speed Steel.* They'll withstand red heat without losing hardness—you can cut *up to 10 times faster* than with carbon steel saw bands and outperform any other type of saws on a cost per cut basis!

Here are some examples of Demon blade performance on DoALL Power Saws:

2½ Times Faster—A midwest plant cutting mild steel reports, "Cut-offs on the DoALL are 2½ to 3 times faster than on our power hack saws . . . blade cost per square inch slightly less than ¼ of a cent."

$500 Monthly Material Saving—the narrow kerf made by the Demon blade saves one major manufacturer $500 per month in tool steel formerly wasted by the heavy cuts of another type machine.

660% Reduction in Tool Cost—an architectural iron company reports cut-off tool cost reduced from $5.00 per day to 75¢ per day since employing Demon saw bands on a DoALL Power Saw.

See a Demonstration—you can watch DoALL Demon H.S.S. Saw Band performance right in your own plant at no cost or obligation. Just call your local DoALL Store, or write: The DoALL Company, Des Plaines, Illinois.

Send for Power Sawing Handbook — facts, figures, data, case studies. 108 pages—free on request.

See DoALL at the A.S.T.E. Show, Booth 1520, March 19-23, International Amphitheater, Chicago, Illinois.

DoALL

SB-43

Reynolds Continues To Expand

New program calls for expenditure of $43 million to meet growing demand for aluminum. Production facilities will be boosted at Texas alumina plant and Alabama sheet mill

REYNOLDS METALS Co., Louisville, has launched a $43-million expansion program. The expenditure will increase production of its La Quinta alumina plant (near Corpus Christi, Tex.) by more than 50 per cent. Facilities of the Sheffield, Ala., aluminum sheet rolling mill will be enlarged.

J. Louis Reynolds, executive vice president, says it is necessary to increase alumina production to supply requirements of a 200-million-lb aluminum reduction plant to be built next to the company's operations in northern Alabama.

Sheet Mill — Increased production of primary metal necessitates greater sheet rolling capacity at the mill near the reduction plant.

Between $25 million and $30 million will be spent to increase production of the La Quinta alumina plant to more than 1500 tons daily (present rated capacity is 1000 tons). The firm's bauxite handling and storage facilities at that point also will be enlarged.

Nearly $13 million will be spent to expand the Sheffield aluminum sheet mill. The largest single expenditure will be for a reversing, 4-high hot mill. Including a building to shelter the equipment, it will cost $4,866,000. Cold rolling equipment will be installed at a cost of $2,956,000.

Soaking pits will cost about $1,667,000; a welded tube department, $576,000. Other equipment to be added at the sheet mill includes a scalper, two annealing furnaces, three roller levelers, sheet embossing machines, an enlarged production line in the cable mill and a new shipping building. Combined cost of these items is estimated at $3 million.

A substantial portion of the output of the projected 200-million-lb aluminum reduction plant at Sheffield will be delivered in molten form to a new foundry which the Ford Motor Co. plans to erect next to the Reynolds facility.

Reynolds has a contract to deliver to Ford 640 million lb of primary aluminum within the next ten years (STEEL, Jan. 16, p. 32). "This is recognized in the aluminum industry as evidence of industry plans to use aluminum in increasing quantity in manufacturing motor cars of the future," Mr. Reynolds commented.

Willamette Iron Gets Contract

Eight wire rope fenders and operating machinery for the St. Lawrence Seaway will be constructed by Willamette Iron & Steel Co., Portland, Oreg. The $834,340 job must be finished by the spring of 1957.

Boosts Extrusion Facilities

Kaiser Aluminum & Chemical Corp., Oakland, Calif., is doubling production at its Halethorpe, Md., plant at a cost of $6,250,000. The plant produces extruded components for aircraft and tubing and extruded shapes for the building and transportation industries. Haskell J. Ross is plant manager.

Improves Testing Facilities

Roberts & Randolph Ultrasonic Co., Baltimore, has equipped a commercial laboratory of several thousand square feet for the ultrasonic testing of materials.

Simplicity Engineering Expands

Simplicity Engineering Co., Durand, Mich., will enlarge its plant by 50,000 sq ft, or 50 per cent of its present floor space. The firm makes screens, feeders, conveyors, foundry shakeouts, sand conditioners and other materials handling equipment.

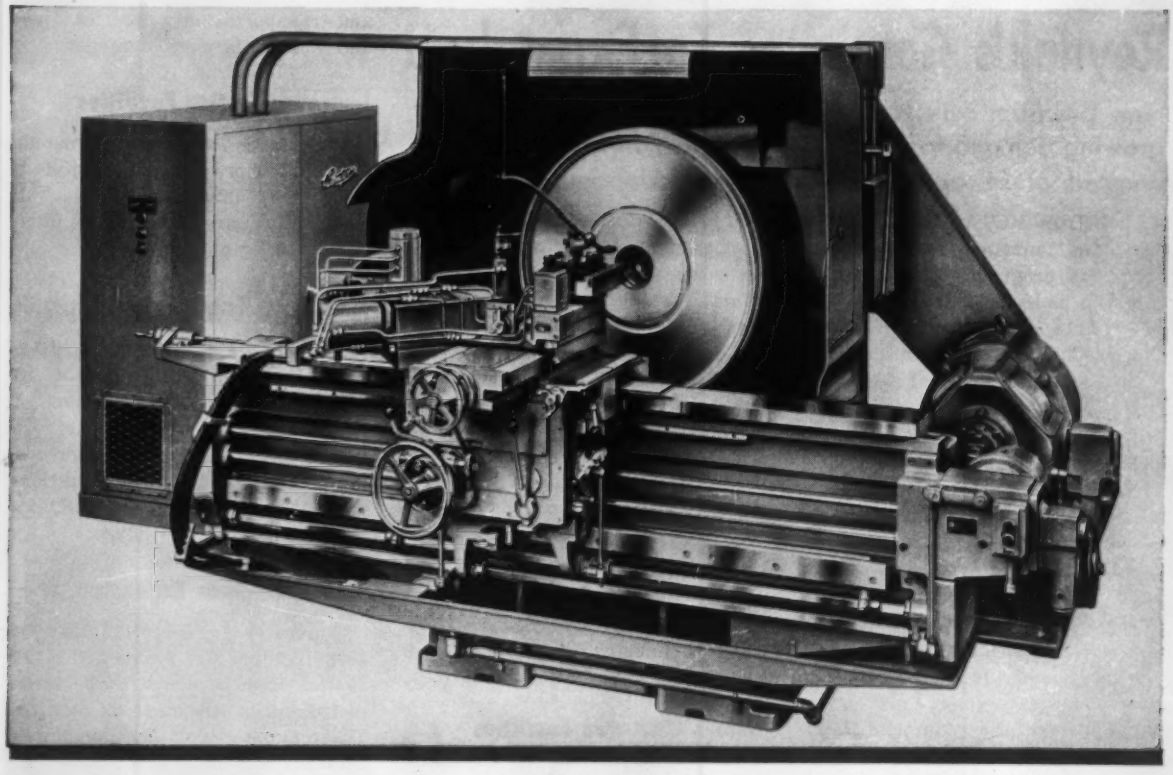
Square D Plans Expansion

Square D Co., Detroit, allocated $9 million for new plants and other capital improvements to be completed during the next 22 months. The amount equals the company's total investment in new plants during the preceding ten years when manufacturing capacity was doubled. The expansion program will provide Square D with an additional 400,000 sq ft of produc-

(*Please turn to page* 114)

West Coast Gets Record Shipment of Titanium Sheet

Described as the largest single shipment of titanium sheet in the five-year commercial history of the titanium industry, the first of two carloads has moved out from the Leechburg, Pa., plant of Titanium Metals Corp. of America to Douglas Aircraft Co., Santa Monica, Calif. Titanium Metals is owned jointly by Allegheny Ludlum Steel Corp., Pittsburgh, and National Lead Co., New York



"Built-in Memory"

selects its own production speed WITH Century Performance-Rated® SELECTIVE

For today's "machines of the future," you can have extremely close-tolerance control over a wide range of process speeds . . . *automatically!* Century Selective Speed Drives can be equipped with "built-in memory" . . . actuated by sensitive "eye" or "feeler" controls.

These "almost-human" drives can regulate precision interlocked multi-motor drives, with speed control both by individual drive or as a group drive. Century Selective Speed Drives offer a wide range of possibilities for integration into automated production or processing sequence operations.

Our engineers will be glad to discuss the opportunities for Century Performance-Rated Selective Speed Drives in your new production planning. Write for more information.

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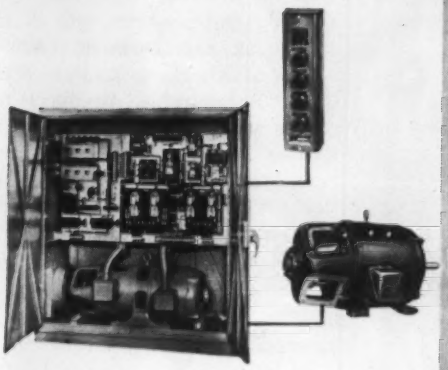
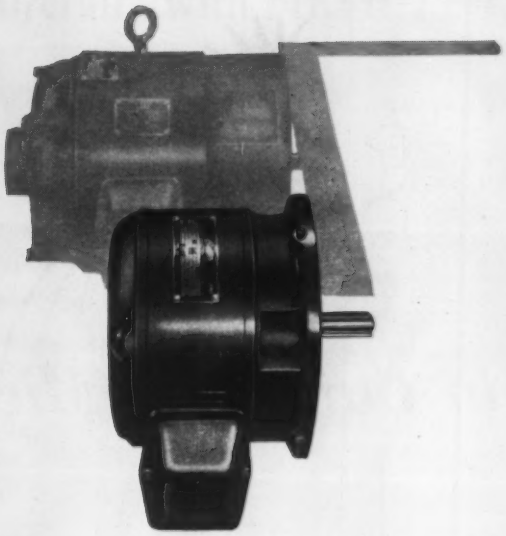
INDUSTRIAL EXPOSITION
INTERNATIONAL AMPHITHEATRE
CHICAGO . . . . . MARCH 19-23, 1956

35RR

Century Selective Speed drive unit maintains constant cutting speed for a contour facing operation on this "T-Lathe". From an infinite number of speeds, the drive automatically selects the optimum speed for varying kinds of work.





NOW AVAILABLE

CENTURY'S NEW SHORTER MOTORS with STANDARD NEMA "D" FLANGE MOUNTINGS For INTERCHANGEABILITY

This new line of shorter, round-frame, end-mounted motors by Century can give you greater freedom in design and engineering. They meet modern demands for compactness and weight-saving . . . with even better performance.

No special mountings are required! These shorter Century motors have full-size NEMA "D" flanges. They are interchangeable with all other popular makes of standard end-mounted motors. The shorter motors are available in sizes from 1 to 15 H.P. . . . in open or totally enclosed fan-cooled frames . . . for vertical or horizontal applications.

For full data, call your nearest Century Sales Office or authorized distributor. Ask for a copy of bulletin 6-1, P1.

SPEED DRIVES

Performance-Rated©
MOTORS
1/20 to 400 H. P.

CENTURY ELECTRIC COMPANY

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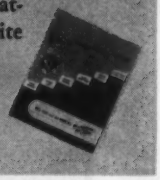
No. 18 in a Series

in Lansing, Michigan

4 out of 5 use WHEELABRATOR® STEEL SHOT

American businessmen know a good thing when they see it. The overwhelming preference for Wheelabrator Steel Shot is a good example. Take Michigan's capital city. Wheelabrator Steel Shot is used in 80% of all airless blast cleaning equipment. It is used in 4 out of 5 machines in Lansing because it gives lowest COST cleaning . . . lowest shot consumption, lowest maintenance and highest production. For instance, Lindell Drop Forge Company reports shot consumption decreased 50%, cleaning time shortened 25% and equipment maintenance sharply reduced. Whatever your cleaning problem, wherever you're located, you can save with Wheelabrator Steel Shot. Write now for Bulletin 89-B.



WHEELABRATOR CORPORATION

World's Largest Manufacturer of Steel Abrasives

509 South Byrkit St., Mishawaka, Indiana

(*Concluded from page* 111)

tion facilities, including a previously announced $3-million Milwaukee plant. The company makes electrical controls.

Installs Forging Press

A 2000-ton forging press for use in the hot working of high-alloy tool steels, other high-alloy and special metal products, will be installed at the Dunkirk (N. Y.) Works of Allegheny Ludlum Steel Corp., Pittsburgh. Auxiliary facilities will include heating and annealing furnaces, finishing equipment, testing and shipping facilities. W. R. Breeler, works manager, says some of the facilities will be in operation before the end of this year.

Lewis-Shepard Buys Plant

Lewis-Shepard Products Inc., Watertown, Mass., purchased the plant, machinery and inventory of United-American Soda Fountain Corp., that city. The plant makes fountains and food service equipment. Lewis-Shepard produces industrial trucks.

Penn Metal Opens Branches

Penn Metal Co. Inc., Parkersburg, W. Va., opened district sales offices in Pittsburgh (under the managership of A. W. Pell) and in Little Rock, Ark. (under the managership of G. C. Davis). Penn Metal makes light structural sections, expanded metal and metal lath and plastering accessories.

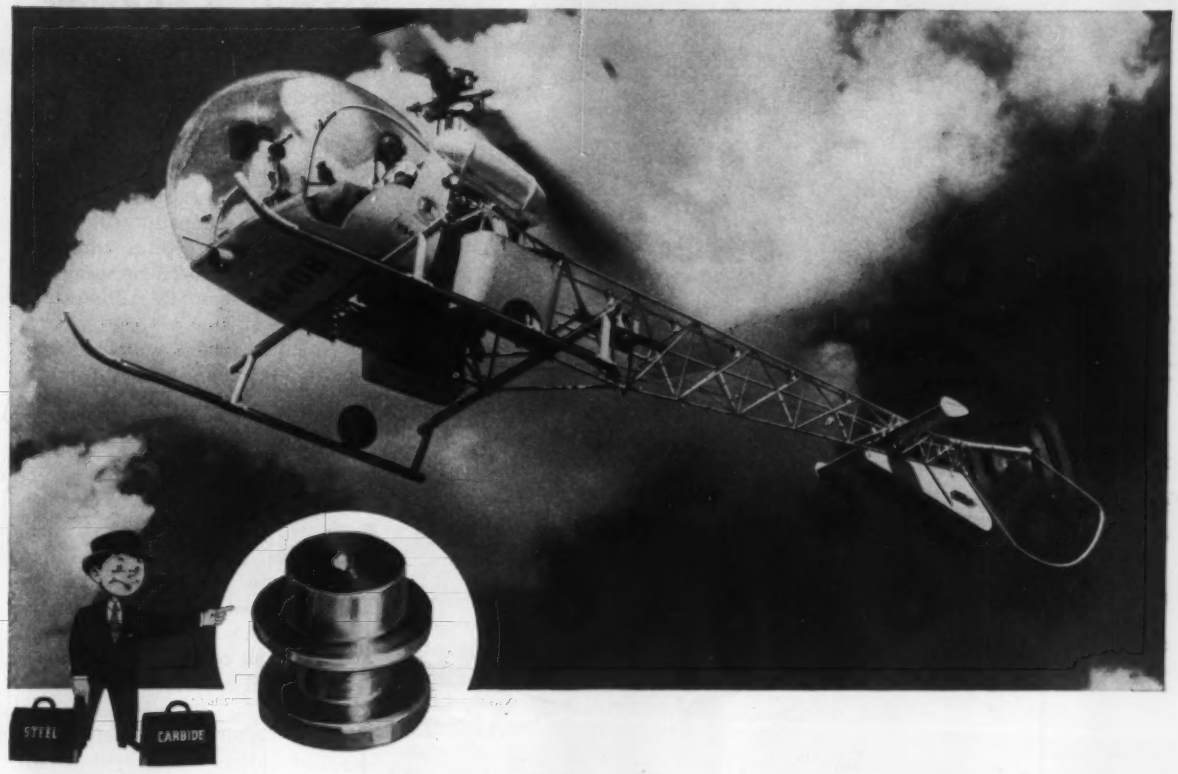
Instrument Maker Expands

Viking Instruments Inc., East Haddam, Conn., will double plant and production facilities. The firm makes electronic control and alarm devices.

Precise Products To Move

Precise Products Corp. will move into a new plant on River road, Racine, Wis. The expanded facilities with over 15,000 sq ft of floor space will permit a 100 per cent increase in production of high-speed portable electric quills, grinder millers, machine tools, rotary tools and accessories.

"Mission accomplished" at Bell Aircraft...with FIRTHITE TXH



133% more needle bearing pins per grind

Down Fort Worth way at famous Bell Aircraft Corporation, they made production tests on the *new* FIRTHITE TXH Carbide . . . turning and facing needle bearing pins from SAE 4140 steel.

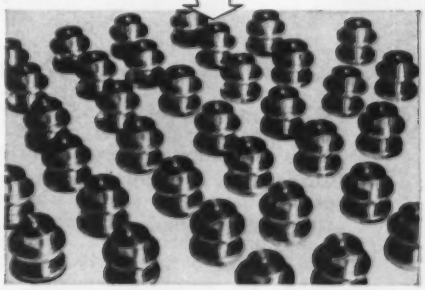
The results speak for themselves:

- 133% more bearing pins per grind.
- More than twice as many pieces per grind as nearest premium grade.
- Seven times more pieces per grind than two other competitive grades.
- Only .007 stock removed to resharpen compared with .025—.035 for competitive grades.

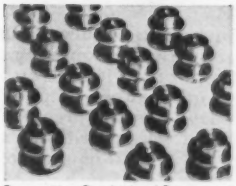
Truly this test proves, as do others all over the country, that FIRTHITE TXH is easily the outstanding carbide in its field . . . a *premium grade* at *no* premium price.

Yes, FIRTHITE TXH is a completely *new* carbide concept . . . a combination of materials and processes designed specifically to do heavy-duty, high-production cutting operations better than they have ever been done before!

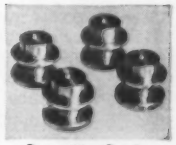
You, too, can make important savings, and increase production with TXH. It's available *now* in all standard tips and tools. Try it today.



FIRTHITE TXH—35 PER GRIND



Competitive Grade A—15 per grind



Competitive Grades B & C—4-5 per grind

R 316

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels
Tool & Die Steels
Stainless Specialties
High Temperature Alloys
Sintered Tungsten Carbides
Firth Heavy Metal
Chromium Carbides
High Temperature Cermets
Zirconium

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...the perfect way
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to buy fasteners!

When you purchase FASTENERS, your first considerations should be given to quality, delivery and prices.

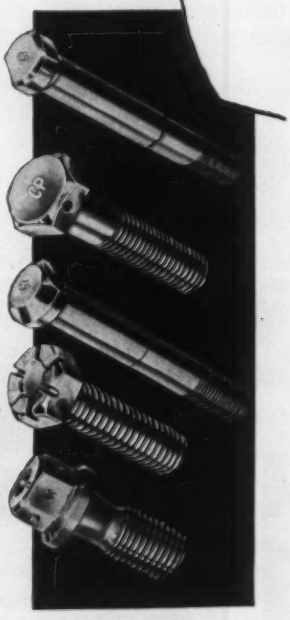
Chandler, as a leading manufacturer of cold forged cap screws, takes the same considerations. Mass production is only part of their story . . . but absolute control during every phase of production means top quality and uniformity.

Realistic pricing is important . . . and is followed.

If your requirements include automotive, Place self-locking, connecting rod or aircraft engine bolts in high carbon alloy and stainless steels, check with Chandler today. They are prepared to produce special heads, drilled heads and shanks, and ground bolts to tolerances as close as 0.0005-inch.

Write today for literature.

Specialists in Thread-Rolling after Heat Treating.



CHANDLER PRODUCTS CORPORATION

1488 Chardon Road • Cleveland 17, Ohio

6473-CH

Steel Mill Expands

Detroit Steel's Portsmouth Works will have larger capacity, greater production flexibility

DETROIT STEEL CORP. is increasing and improving production facilities at its Portsmouth (O.) Works. The company will spend $20 million on capital improvements during 1956-57, bringing the total to more than $90 million since 1950, says M. J. Zivian, president.

The initial phase will lift ingot capacity 160,000 tons by September of this year from the present rated capacity of 1,290,000 tons. This will be accomplished by adding one 275-ton open-hearth furnace to the No. 2 open-hearth shop.

Direct Rolling—The current program will provide direct rolling from ingots to finished strip by adding a mechanical flame scarfer and two stands to the hot strip mill and a second coiler.

Mr. Zivian explained in an interview at the Portsmouth Community Labor-Management Day that production then will follow this line: Slabbing and blooming mill, automatic scarfer, slab heating furnace, breakdown mill, 6-stand hot strip mill and coilers.

A substantial part of the investment under the current program will be in a new sintering plant for concentrating blast furnace ore and reclaiming flue dust. This will increase pig iron capacity to 1 million tons annually from the present 800,000 tons.

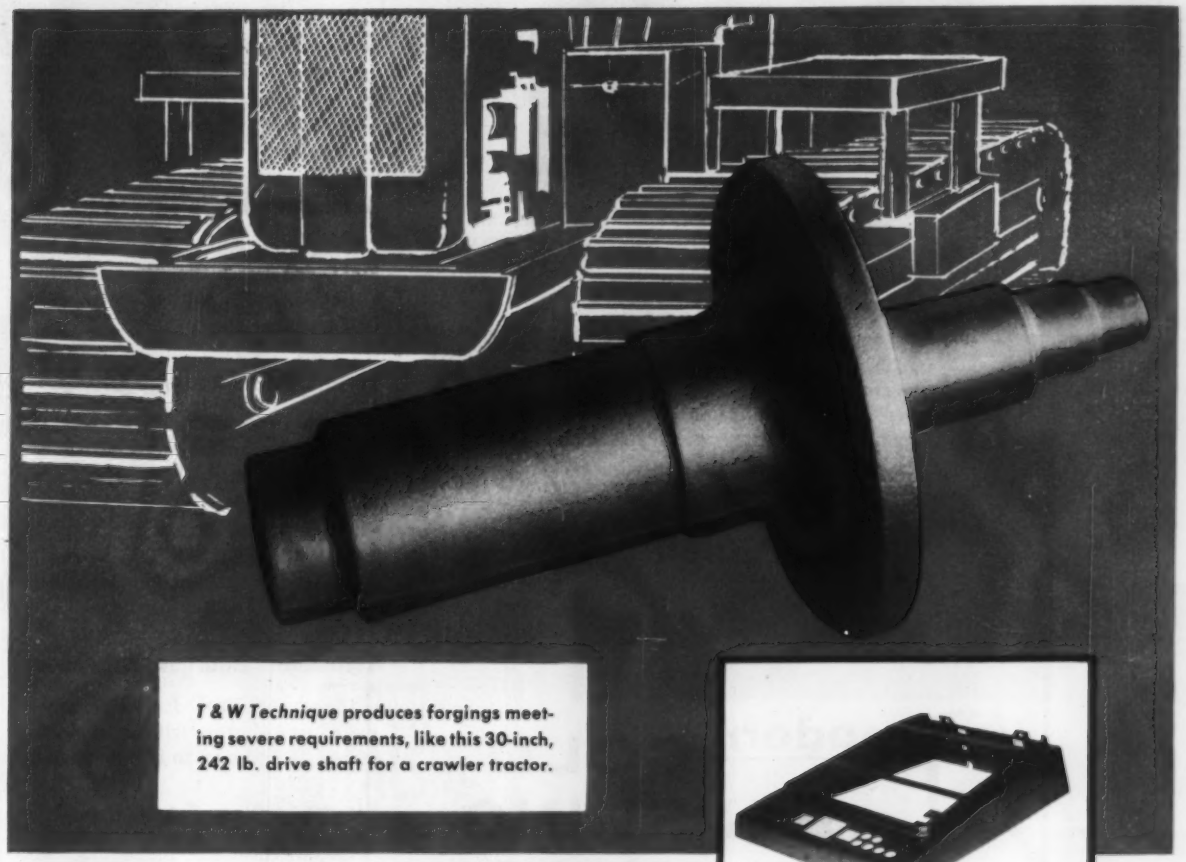
The company also plans to add four circular soaking pits. Additional finishing facilities will be provided for the cold-rolled sheet and strip mill.

Metal Fabricator Expands

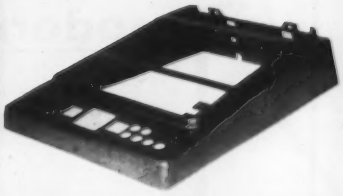
William F. Zeller Co. Inc., Baltimore, will enlarge its sheet metal products manufacturing space with a 2800-sq-ft addition.

Westinghouse To Build Plant

Westinghouse Electric Corp., Pittsburgh, will construct a multi-million dollar, 250,000-sq-ft plant near Dover, N. J., for the production of electric stairways. It will complement the manufacturing



T & W Technique produces forgings meeting severe requirements, like this 30-inch, 242 lb. drive shaft for a crawler tractor.



This radar unit base, deep drawn from 16 gage steel, 7" x 18" x 24", is an example of what *T & W Technique* can accomplish in stampings.

How to put the POWER of T&W TECHNIQUE behind your cost reduction efforts

● You can concentrate outstanding engineering, organizing, and production facilities on your problem of cost reduction by making use of *T & W Technique*. Starting with design, and following through to delivery, *T & W Technique* is the coordination of a great organization to furnish you forgings and stampings so they cost you less at your point of assembly. Find out now what our special methods and services can do for *you*. Send the coupon today.

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TO: Transue and Williams, Alliance, Ohio

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☐ Forgings ☐ Stampings

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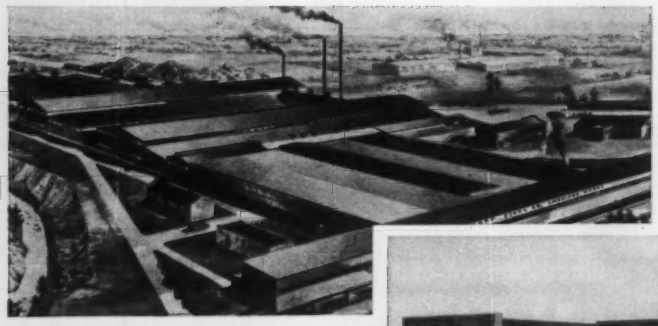
Company _____

Street _____

City _____ Zone ____ State _____

1303

T & W DEEP DRAWN STAMPINGS AND FORGINGS USUALLY COST LESS AT THE POINT OF ASSEMBLY



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NEWARK, N. J.

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4 modern COLD FINISHING MILLS

to serve you . . .
promptly and efficiently

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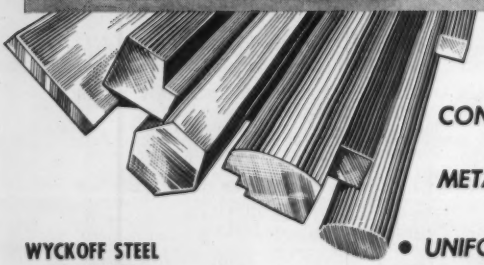

CONSTANT QUALITY AND METALLURGICAL CONTROL assure

- UNIFORM PRODUCTION
- INCREASED MACHINE SPEEDS
- LONGER TOOL LIFE

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Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Wide Flats up to 12" x 2" and 14" x 1¼" • All types of furnace treated Steels

SPECIALISTS IN COLD FINISHED STEELS EXCLUSIVELY

WYCKOFF STEEL COMPANY

GENERAL OFFICES:
Gateway Center, Pittsburgh 30, Pa.
Branch Offices in Principal Cities
Works: Ambridge, Pa.—Chicago, Ill., Newark, N.J.—Putnam, Conn.

space now available at the main Jersey City, N. J., plant where production of its elevators and electric stairways has been centered. The plant is expected to be in operation early in 1957.

Bethlehem Builds Shop Addition

Bethlehem Steel Co.'s Shipbuilding Division, Baltimore, is erecting a 12,000-sq-ft addition to its electric shop.

Luria Opens Canadian Office

Luria Bros. & Co. Inc., Philadelphia, scrap broker, opened an office at 26 James St. S., Hamilton, Ont. The office makes the second in Canada and brings the total of Luria offices to 19. I. L. Vosko is district manager in the Hamilton office.

Clendenen Enlarges Warehouse

Clendenen Bros. Inc., Baltimore, metal distributor, will erect a 15,000-sq-ft addition to its warehouse.

Slaysman Plans Expansion

Slaysman Co., Baltimore, acquired Kemp Machinery Co. and Universal Sheet Metal Co., that city. The buildings of these two companies are to be demolished and their businesses liquidated. Slaysman, producer of power transmission machinery, gears and power presses, will use the acquired space for a 5000-sq-ft plant addition.

ASSOCIATIONS

Dr. M. O. Holowaty, chief of raw materials research at Inland Steel Co., Chicago, received the J. E. Johnson Jr. award from the **American Institute of Mining & Metallurgical Engineers,** New York.

E. N. Case, Ajax Electric Co., Philadelphia, was elected president of the newly formed **Salt Bath Institute,** 7307 Euclid Ave., Cleveland 3, O. The following manufacturers were represented at the initial meeting: Ajax Electric Co.; Metals Processing Division, American Cyanamid Co., New York; Heat-

MALLEABLE
SHOT *and* GRIT

. . . of dependable quality

METAL BLAST's modern methods produce better abrasives. METAL BLAST's mass production permits lower prices. That's why you'll find METAL BLAST abrasives in leading foundries . . . everywhere. If you haven't tried them — you should!

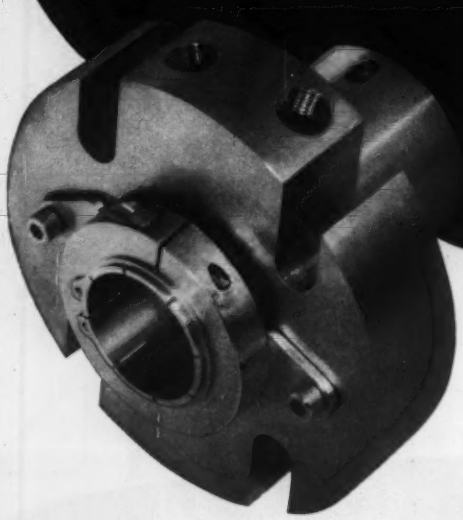
METAL BLAST, INC.

872 EAST 67th STREET • CLEVELAND 3, OHIO

THE LARGEST INDEPENDENT MANUFACTURER OF ABRASIVES . . . PRODUCING THE FINEST CHILLED AND MALLEABLE SHOT AND GRIT ON THE MARKET

NEWEST OF THE GARLOCK 2,000

GOODBYE TO PUMP SEAL MAINTENANCE



Imagine! You just install the new Unitary Mechanipak Seal and forget it! No shutdowns for maintenance. It's completely self-contained . . . comes to you ready to install . . . no on-the-job adjustments needed. And, it's leakproof . . . sealing faces are precisely lapped and pressure balanced on high pressure models.

The remarkable Mechanipak is only one of the famous GARLOCK 2,000 . . . two thousand different styles of packings, gaskets, and seals to meet *all* your needs . . . The *only* complete line available. That's why you get *unbiased* recommendations from your Garlock representative. Call him today or write for Mechanipak Catalog AD 151.

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For Prompt Service, contact one of the 30 sales offices and warehouses throughout the U. S. and Canada.

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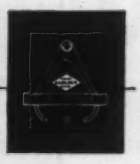


bath Corp., Chicago; A. F. Holden Co., Detroit; E. F. Houghton Co., Philadelphia; and Upton Electric Furnace Co., Detroit.

The Plumbing Brass Institute, 1 Gateway Center, Pittsburgh 22, Pa., has been organized by 30 manufacturers of plumbing brass. It is the result of a merger of Sanitary Brass Institute, Tubular Brass Goods Institute and Brass Gas Stop Institute. Officers are: A. H. Goepel, Scovill Mfg. Co., Waterbury, Conn., president; G. L. Hartmann, Milwaukee Faucets Inc., Milwaukee, first vice president; J. D. Clemens, Hays Mfg. Co., Erie, Pa., second vice president; M. C. Frost, Frost Co., Kenosha, Wis., treasurer. Hanson & Shea Inc., Pittsburgh, will serve as secretary. The institute formed four product sections: Rough cast plumbing brass, finished cast brass, tubular plumbing brass, and gas stops and iron body valves.

NEW ADDRESSES

Wheeling Corrugating Co., a sales subsidiary of Wheeling Steel Corp., Wheeling, W. Va., moved its Kansas City branch to 820 Atlantic St., North Kansas City, Mo. J. P. Byrne is branch manager; S. L. Webb, assistant manager.

Chase Brass & Copper Inc., Waterbury, Conn., a subsidiary of Kennecott Copper Corp., moved its Kansas City, Mo., office and warehouse to 1710 Washington St., that city. The warehouse will carry stocks of the company's brass and copper mill products and certain other items, including stainless steel.

American Engineering Co. moved its main office to Wheatsheaf lane and Sepviva street, Philadelphia 37, Pa. The firm is engaged in the fields of marine deck auxiliaries and steering gears, hoists, fluid power equipment, stokers and incinerators.

Reed-Prentice Corp., Worcester, Mass., a subsidiary of Package Machinery Co., opened a sales office at 1846 Owendale Drive, Day-

At Latrobe . . . the horse came before the cart!

DESEGATIZED®

Process of Manufacture

XL® High Speed Steels
FM Die Steels

Latrobe's DESEGATIZED® high speed steels and high carbon-high chromium die steels have a uniformity in their structures . . . an overall, even distribution of wear-resistant carbide particles . . . a result of the DESEGATIZED® process of manufacture.

Now, through that same DESEGATIZED® process, Latrobe produces XL® high speed steels and free-machining FM die steels containing evenly distributed alloy sulphides. These uniformly dispersed sulphide additives create an internal lubricating action resulting in improved machinability characteristics and better tool life in many applications. No sacrifice of mechanical properties or heat treating procedures to gain this extra machinability! Without exception, the extra toughness, greater wear resistance and other advantages of DESEGATIZED® steels are found in XL® and FM steels.

The development of DESEGATIZED® steels had to precede the "free machining" development since the successful performance of free machining steels is dependent upon the uniform dispersion of sulphide additives. The horse had to come before the cart!

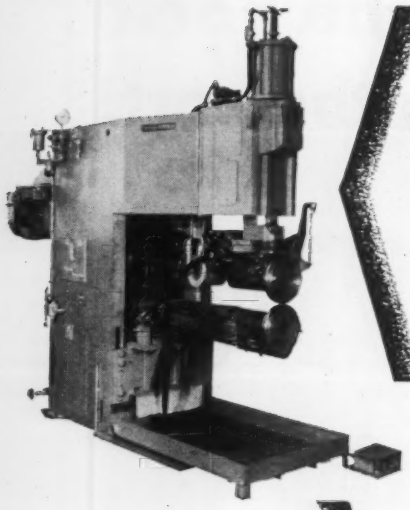
For complete details on DESEGATIZED® XL® high speed steels and free machining FM die steels, call your local Latrobe representative. He will be pleased to show you all the advantages of Latrobe's tool and die steels and the vast range of stock sizes available from conveniently located warehouses.

TOMORROW'S TOOL STEELS TODAY! . . . WHEN YOU NEED THEM

Latrobe Steel Company

MAIN OFFICE and PLANT: LATROBE, PA.

Branch Offices and Warehouses Located in Principal Cities

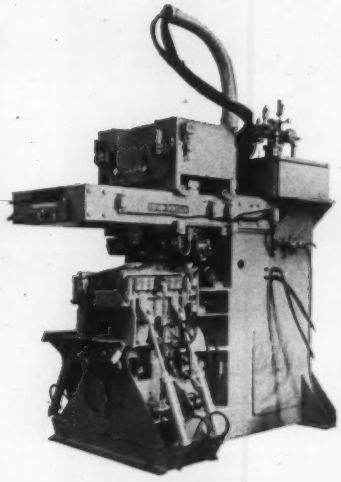


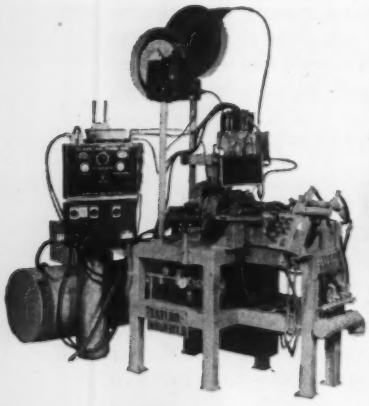
STANDARD RESISTANCE WELDERS

Efficient, versatile for all basic uses; low operating cost, prompt delivery, long service life. T-W manufactures a complete line of resistance welder equipment—spot, seam, projection and flash-butt.

SPECIAL RESISTANCE WELDERS

Resistance welders specifically designed for your work—most efficient production, including mechanical features, such as feed, handling, discharge, bending, forming or machining.





SPECIAL ARC WELDERS

Custom designed for arc-welding assemblies on a production basis. All modern welding methods and equipment are incorporated. T-W are specialists in production line techniques.

The **TAYLOR·WINFIELD** *Corporation*

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ton 9, O. Eric Brierley will operate the office and carry on direct sales of the firm's plastic injection molding presses and die-casting machines.

Link-Belt Co. moved its executive offices to the Prudential Bldg., Prudential Plaza, Chicago 1, Ill.

ANNIVERSARIES

America's steel wire industry was 125 years old on Feb. 28. When Ichabod Washburn, a blacksmith, and his partner, Benjamin Goddard, signed a contract for water rights and the erection of a small wire drawing shop on that date in 1831, they launched the wire drawing industry in America, as well as the **American Steel & Wire Division** of United States Steel Corp. From this beginning at Northville, just outside Worcester, Mass., the industry has grown steadily. In 1955 it produced 5,533,000 tons of wire products.

REPRESENTATIVES

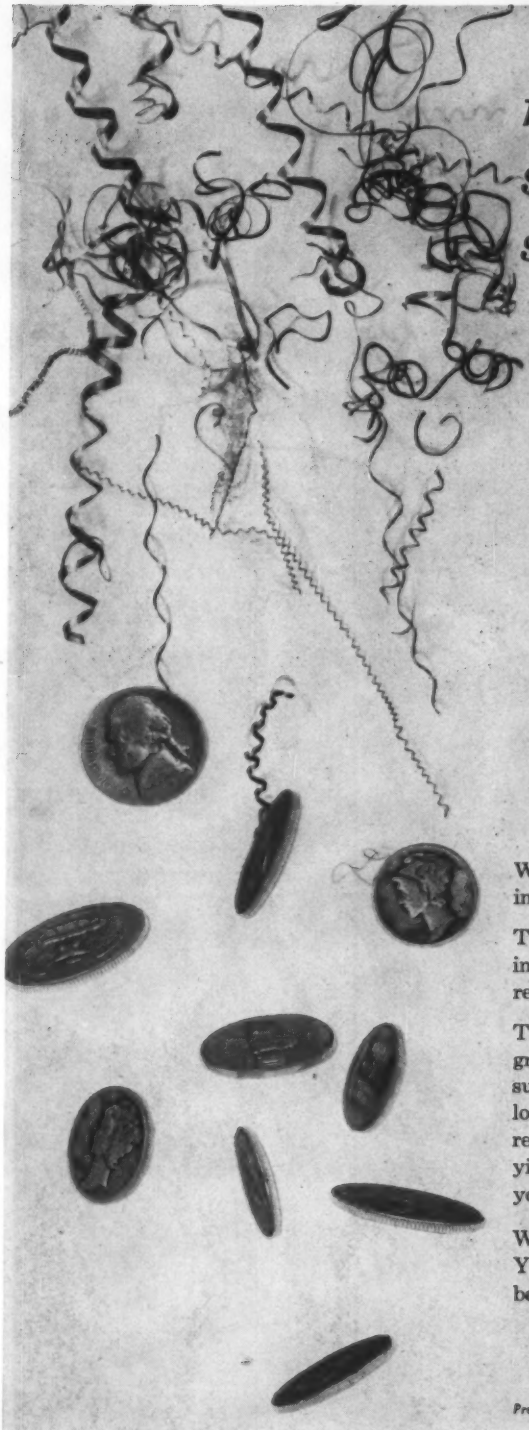
Yale & Towne Mfg. Co.'s Materials Handling Division, Philadelphia, appointed Kaiser Steel Co.'s Fabricating Division, Montebello, Calif., as its west coast sales and service depot for its electric hoists.

Worcester Pressed Steel Co., Worcester, Mass., appointed Reece Geissinger Associates, Pittsburgh, metal stamping sales representatives.

W. F. Wolf Co., Los Angeles, was appointed sales representative for **Speed-D-Burr Corp.,** Glendale, Calif., manufacturer of precision barrel finishing equipment.

W. W. Munroe Co., St. Louis, was appointed a distributor for the materials handling trucks of the **Baker-Raulang Co.,** Cleveland.

R. M. McKenna was appointed district sales representative for **Leschen Wire Rope Division, H. K. Porter Company Inc.,** New York. His territory includes Manhattan, Bronx and all of Long Island.



making stainless steel?

WASTE IS COSTLY!

Waste can mean a lot, especially if you have excessive conditioning costs or high rejection rate.

The addition of Vancoram Grainal Alloys has greatly improved hot-working characteristics of stainless and heat-resisting grades for many producers.

Think what that means—particularly in the higher alloy grades that are prone to develop cracks and other surface defects. Grinding, chipping and scarfing—the loss of good metal can be held to a minimum. You save in rejection and conditioning costs, which result in higher yield and the conservation of scarce alloying elements. And you step up production at the same time.

Why not try this new application of Vancoram Grainal Alloys. Your nearest Vanadium Corporation Sales Office will be glad to help you.

VANCORAM

Producers of alloys, metals and chemicals

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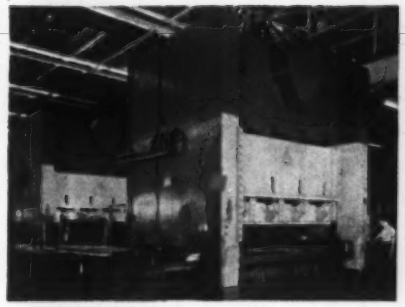
YOUR Productive Efficiency

When people are making up their minds to buy, they take a careful look at the products of various manufacturers . . . comparing . . . calculating. In effect, they are basing their purchasing decision on the productive ability of your manufacturing organization. True, people don't care what manufacturing methods you use, they're interested only in results. But if your manufacturing methods are highly efficient you can offer more at the point of sale. Parts of your product—even those not seen by the buyer—when produced more efficiently on Clearing presses, can help your product hit the sale's jackpot. More efficient manufacture of these parts may enable you to offer a superior finish, more sales-appealing fittings—the extras that will give your product the nod.

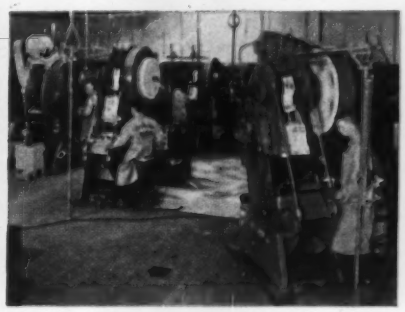
PAYS OFF AT THE POINT OF SALE

CLEARING CAN HELP YOU PLAN FOR HIGHER PRODUCTIVITY

If you've been looking for a better production method, Clearing engineers can help you. We are not limited, and have no preference for any one type of press. The equipment recommended will be the kind best suited to your specific manufacturing problems. We have specialists in hydraulic, mechanical, extrusion and forging equipment, to place at your service. These consultants are ready to work with your engineers to plan a more productive metalforming operation for your plant. If transfer feed equipment will solve your problem, you'll find a more efficient answer at Clearing. Discuss the entire problem—feeding, material handling, controls, high speed equipment, special presses, maintenance. Call or write Clearing Machine Corporation, 6499 West 65th St., Chicago 38, Illinois.



Major economies made possible by automatic production of kitchen range bodies on these Clearing transfer-feed presses are passed on to the consumer in terms of a finer, and a more highly sales-appealing, finished product.



A contract stamping company recently standardized on Clearing open back inclinable presses. Their Clearing equipment simplifies feeding, lowers maintenance cost and speeds output, thus enabling the company to compete more effectively for job stamping business.

The giant Clearing hydraulic press shown above makes it possible for a well-known steel company to increase their service and as a result increase sales by producing plate far more economically than had been previously possible.

CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION

CLEARING MACHINE CORPORATION • *Division of U. S. INDUSTRIES, INC.*

If you are thinking of a better way to do the job, that's the name of the new Clearing brochure that's yours for the asking. Write us today.

"It Really Made Me THINK!"

"The other day when the Detrex man was in to see me, he dropped a couple pieces of information that really made me stop and think. The first thing he pointed out was that metalworking and surface preparation account for ¼ to ⅓ of all the operations in the average metalworking plant. That started the gears rolling. If this was true in our plant, here was a good spot to realize some important dollar savings.

"Well, after finding that 30% of our operations were in metal cleaning and surface preparation, I knew this was the spot to cut some costs . . . and no better way to start than by talking to a technician from Detrex. After all, they make a complete line of chemicals for metal cleaning and surface preparation —as well as the equipment too.

"To make a long story short, the Detrex technician surveyed our plant and came up with several cost-cutting suggestions that were pretty important to us. You know, I bet he could do the same thing for you in your plant. You don't even have to take the time to make the survey. I found out he will do it for you and it won't cost you a cent. Most likely you, too, will realize some important savings as a result of the survey. Talk to the Detrex technician about it the next time he calls, or write direct to their main office if you wish."

Service with a Saving!

DETREX CORP.

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DEGREASERS • DEGREASING SOLVENTS • WASHERS
ALKALI & EMULSION CLEANERS • DRYCLEANING
EQUIPMENT • PHOSPHATE COATING PROCESSES

Phosphate Coating

Detrex zinc phosphate coatings provide a permanent, rust-resisting surface and at the same time bonds the paint finish to the metal. Paint peeling and flaking are retarded, corrosion from moisture is prevented. Phosphate coatings can be economically applied by either immersion or spray methods.

Emulsion Cleaners

Detrex emulsions clean metal and retard rust in one operation. Once metal parts have been cleaned with Detrex Emulsion Cleaners rust will not attack them. Because they will not attack any known metal or alloy, Detrex Emulsion Cleaners offer greater flexibility. Temperatures, concentrates and chemicals can be tailored to your specific cleaning needs.

Degreasing Solvent

Detrex Perm-A-Clor has superior stability and resists break-down into sludge or corrosive acid. Thus, Perm-A-Clor assures trouble-free, continuous production. Eliminates costly shutdowns for replacement of spoiled solvent, clean-out of sludge and neutralizing of cleaning equipment.

A Guide to TOOL STEELS & CARBIDES

Looking for a tool steel to do a specific job? Want to know where to buy a finishing carbide? This guide has the answers. It is a single source of information on more than a thousand different tooling materials. Knowing the job to be done, you can determine, with the guide, what product to buy and where to buy it. Cross indexes make it easy to locate tool steels and carbides by tradename, or to compile a list of sources for a specific type.

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COMPILED BY THE EDITORS OF STEEL The Metalworking Weekly PENTON BLDG., CLEVELAND 13, O.

March 12, 1956

About The Guide

SIXTY-SIX companies are listed alphabetically in this guide. Under each company, the steels and carbides it offers also are listed alphabetically—first by primary application (see table at right), then by tradename. Where possible, the AISI-SAE classification is designated.

The third column gives the chemical analysis of the material, and the last column on the right tells suggested quenching media, machinability annealed and the movement in hardening.

The tradename index makes it easy to locate any of the listed materials. A second index (page S-6) shows which companies offer materials for the various primary applications.

Breakdown of Primary Applications

CUTTING TOOLS (Finishing)—Box turner—Forming—Shaving—Parting — Reaming — Boring — Counterboring—Broaching—Gear cutting — Threading — Milling — Planing — Filing — Scraping—Circular shearing—Hollow milling

SHOCK RESISTING (Repeated Impact)—Shearing—Riveting—Backing up—Burring—Caulking—Chisels—Hammers—Swaging

SHOCK RESISTING (Intermittent Impact)—Dowel pins—Drifts—Pilots—Screw driving—Tool shanks

COLD WORK DIES (Blanking)—Blanking—Lamination—Notching—Trimming

COLD WORK DIES (Cold Forming)—Nut and bolt—Heading—Crowning and crimping—Thread and form rolling—Bulldozer—Stamping—Notching—Burnishing—Drawing—Coining—Wire, rod and tube drawing—Extruded—Swaging—Knurling—Powder compression—Embossing-jewelry etc.—Bending

PUNCHING AND SHEARING—Railroad tie-plate punches and dies—Railroad tie-plate shear blades—Structural shapes shear blades and punches—Perforating punches and dies

HOT WORK DIES (Hot Punching and Shearing)—Railroad tie-plate hot punching and shearing—Railroad splice bar hot punching and shearing—Hot billet, bar and plate shears—Hot trimmers dies—Hot punches

HOT WORK DIES (Hot Forming) — Forging die inserts — Hot gripper and header dies—Hot compression dies—Hot extrusion dies—Hot bending dies—Hot swaging dies

PLASTIC MOLDING DIES (Hubbed Cavity Dies)

PLASTIC MOLDING DIES (Machine Cut Gravity Dies)

PLASTIC MOLDING DIES (Hubs)

PLASTIC MOLDING DIES (Ejector Pins)

DIE CASTING DIES—Molds—Trimming dies—Ejector pins

HIGH-STRESS AND HIGH-WEAR MACHINERY PARTS — Chuck jaws—Clutch pins—Collets and feed fingers—Clutch and chuck fingers—Quills—Stripper plates—Arbors—Drill bushings—Cams—Cam rolls—Centers—Mandrels—Spindles

GAGES — Plug — Ring—Snap—Thread plug—Thread ring— Best types of tool steels used for making gages are the manganese oil hardening, high carbon chrome, graphite (oil hardening) and high speed

Index of Materials by Tradenames

Companies Supplying These Materials are Indicated by Their Listing Number

	Listing No.
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A Carbide	2
AA Carbide	2
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A-H5	10
Airaloy	52
Airerat	42
Airdi 150	18
Air Hard	61
Air Hardening	22
Air Hardening #30	52
Air Hardening #40	52
Airkool	18
Airloy	3
Airmold Die Casting	18
Airpro	11
Airque	14
Air-Shock	48
Airtem	39
Airtreat	34
Airvan	26
Alcodie	17
Alco M	60
Alco S	60
Alhead	3
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Alidie-FM	63
Alloy B	60
Alte	6
Altoloy	6
Alva Extra	18
ALX	3

	Listing No.
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A. M. D.	21
Annite No. 1	11
Annite No. 2	11
AO2O	45
Apex Drill Rods	39
Armaloy	5
Armide	5
Armstrong	5
Arrestite	52
A. S. #5	1
A. S. #7	1
A. S. #121	1
A. S. Duramold B.	1
A. S. No. 66	1
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CERAMIC CUTTING TOOLS

MANUFACTURER	TRADENAME
American Lava Corp., Manufacturers Rd., Chattanooga 5, Tenn.	ALSIMAG
Carboloy Department, General Electric Co., 11147 E. Eight Mile Rd., Detroit 32, Mich.	O-30 CEMENTED OXIDE
Diamonite Products Division, United States Ceramic Tile Co., 217 Fourth St. N.E., Canton 2, O.	DIAMONITE
Kearfott Co. Inc., Little Falls, N. J.	(Sintered Alumina)
Norton Co., Worcester, Mass.	(Experimental)
Stupakoff Division, Carborundum Co., Latrobe, Pa.	STUPALOX
U. S. Stoneware Co., 12 East Ave., Tallmadge, O.	ALITE

Index of Materials by Companies

Products are available for the primary application indicated by an (x) in this table opposite company's name. For more specific information see company's complete listing on page indicated.

LISTING NUMBER and COMPANY	PAGE NO.	PRIMARY APPLICATIONS FOR WHICH PRODUCTS ARE LISTED									CAST TYPE	CARBIDES
		Cold Work Dies	Cutting Tools	Die-casting Dies	Gages	Hi-Stress Non-Wear Mach'y Parts	Hot Work Dies	Plastic Mold Dies	Punching and Shearing	Shock Resisting		
1—Ackerlind Steel Co. Inc.	S-7	X	X					X		X		
2—Adamas Carbide Corp.	S-7	X	X						X			X
3—Allegheny Ludlum Steel Corp	S-7	X	X	X	X	X	X	X	X	X	X	X
4—Amalgamated Steel Corp.	S-9	X		X	X	X	X	X	X	X		
61—Anchor Drawn Steel Co.	S-38	X	X	X	X	X	X	X	X	X		
5—Armstrong Bros. Tool Co.	S-10		X									X
6—Associated Steel Co.	S-10	X	X			X						
7—Atlantic Steel Corp.	S-10	X							X	X		
8—Atlas Steels Ltd.	S-11	X	X	X			X	X	X	X		
9—Bedford Tool & Forge Co.	S-12									X		
10—Bethlehem Steel Co.	S-12	X	X	X			X	X	X	X		
11—Bissett Steel Co.	S-13	X	X	X			X		X	X		
12—Blackalloy Co. of America	S-14		X									
13—H. Boker & Co. Inc.	S-14	X	X				X					
14—Braeburn Alloy Steel Corp.	S-14	X	X	X			X			X		X
15—Carboloy Dept., G. E. Co.	S-14	X	X			X	X			X		X
16—Carpenter Steel Co.	S-15	X	X	X	X	X	X	X	X	X		
61—Colonial Steel Co.	S-38	X	X	X	X	X	X	X	X	X		
17—Columbia Tool Steel Co.	S-16	X	X	X			X	X	X	X		
18—Crucible Steel Co. of America	S-17	X	X	X	X	X	X	X	X	X		
19—Darwin & Milner Inc.	S-18	X	X				X	X	X	X		
20—Delaware Tool Steel Corp.	S-19									X		
21—Diehl Steel Co.	S-19	X	X				X		X			
21A—Henry Disston Div., H. K. Porter Co.	S-19	X	X	X			X	X	X	X		
22—DoAll Co.	S-20	X	X			X				X		X
23—Faitoute Iron & Steel Co. Inc.	S-20	X	X							X		
24—A. Finkl & Sons Co.	S-21						X		X			
25—Firth-Loach Metals Inc.	S-21	X	X				X		X	X		X
26—Firth Sterling Inc.	S-21	X	X	X		X	X		X	X		X
27—Great Western Steel Co. Inc.	S-23	X	X				X	X		X		
28—Hawkridge Bros. Co.	S-23	X	X				X	X		X		
29—Haynes Stellite Co.	S-24		X				X		X	X	X	
30—Heppenstall Co.	S-24	X		X			X	X	X			
31—Hidalgo Steel Co.	S-25	X							X			
32—Houghton & Richards Inc.	S-25	X	X	X			X	X	X	X		
33—Hoyland Steel Co. Inc.	S-27	X	X	X			X	X		X		
34—Jamison Steel Corp.	S-27	X					X		X	X		
35—Jessop Steel Co.	S-28	X	X	X	X		X		X	X	X	
36—Kennametal Inc.	S-29	X	X			X	X					X
37—Kloster Steel Corp.	S-29	X	X				X			X		
38—Latrobe Steel Co.	S-29	X	X	X	X	X	X	X	X	X		
39—Lehigh Steel Corp.	S-30	X	X			X	X		X	X		
40—P. F. McDonald & Co.	S-30	X	X	X			X	X	X	X		
41—McInnes Steel Co.	S-31	X										
42—Marshall Steel Co.	S-31	X										
43—Meridian Steel Co.	S-31	X	X				X		X	X		X
44—Metal Carbides Corp.	S-31	X	X						X	X		X
45—A. Milne & Co.	S-32	X	X	X	X	X	X	X	X	X		
46—Newcomer Products Inc.	S-32		X									X
47—North American Steel Co.	S-32	X				X						
48—Peninsular Steel Co.	S-33	X		X	X		X	X	X	X		
49—Pennsylvania Steel Corp.	S-33	X	X				X		X			
50—Horace T. Potts Co.	S-34			X		X		X	X			
51—Pyramid Steel Co.	S-34	X				X	X			X		
52—Republic Steel Corp.	S-34	X	X	X			X	X	X	X		
53—Jos. T. Ryerson & Son Inc.	S-35	X	X	X	X	X		X	X			
54—Sandvik Steel Inc.	S-35	X	X									X
55—Seaboard Steel Co. of America	S-35	X	X			X			X			
56—Simonds Saw & Steel Co.	S-35	X	X				X			X		
57—Timken Roller Bearing Co.	S-36	X			X	X	X		X			
58—Tungsten Alloy Mfg. Co. Inc.	S-36		X							X		X
59—Uddeholm Co. of America Inc.	S-36	X		X	X		X	X	X	X		
60—Universal-Cyclops Steel Corp.	S-37	X	X	X	X		X	X	X	X		
61—Vanadium-Alloys Steel Co.	S-38	X	X	X	X	X	X	X	X	X		
62—Vascoloy-Ramet Corp.	S-39		X							X		X
63—Vulcan Crucible Steel Co.	S-39	X	X	X	X	X	X	X	X			
64—Wesson Co.	S-40		X			X				X		X
65—Willey's Carbide Tool Co.	S-40		X			X						X
66—Ziv Steel & Wire Co.	S-40	X	X		X	X	X		X	X		

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

ACKERLIND STEEL CO. INC., 392 W. Broadway, New York 12, N. Y. — Listing No. 1

Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. #5 Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air Mach. 70 Movement +A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. #121 Air Hardening	A4	C 1.00, Mn 2.00, Cr .90, Mo .90	Air Mach. 65 Movement +A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	A.S. TRI-ACK Air Hardening	D2	C 1.50, Si .30, Mn .30, Cr 12.00, Mo .80, V .40	Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	BLUE LABEL Water Hardening	W1	C 1.00, Mn .30, Si .25	Water Mach. 100 Movement ±C
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	GREEN LABEL Oil Hardening	O1	C .90, Mn 1.15, Si .25, Cr .50, W .50, V .20	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	VI-CHROME Oil Hardening	D3	C 2.25, Cr 12.00, Mn .30, Si .30, V .60	Oil Mach. 40 Movement +B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	VIOLET LABEL Oil Hardening	O7	C .90, Mn .30 max, Si .25, Cr .50, W 1.50, V .20	Oil Mach. 80 Movement +B
Cold Work Dies (Blanking, Cold Forming, Punching, Shearing)	WHITE LABEL Water Hardening	W2	C 1.05, Mn .30, Si .25, V .20	Water Mach. 95 Movement ±C
Cutting Tools (Roughing, Finishing)	A.S. No. 66 High Speed	M2	C .85, Cr 4.00, W 6.50, Mo 5.00, V 1.90	Oil, Air Mach. 65 Movement ±A
Plastic Molding Dies	A.S. DURAMOLD B Oil Hardening	P2	C .07, Mn .30, Cr 1.00, Mo .25, Si .15, Boron Added	Oil Mach. 50 Movement +B
Plastic Molding Dies	A.S. SPECIAL HOBBING IRON Water Hardening	P1	C .05, Mn .10, Si .10	Water Mach. 40 Movement +C
Plastic Molding Dies (Hobs)	A.S. #7 Oil Hardening	S1	C .45, Si .75, Mn .25, Cr 1.15, W 2.55, V .20	Oil Mach. 75 Movement +B
Shock Resisting Tools (Repeated, Intermittent Impact)	(See A.S. #7 Listed Above)			

ADAMAS CARBIDE CORP., Kenilworth, N. J. — Listing No. 2

Cutting Tools (Very Fine Precision Boring & Finishing, Cast Iron, Nonferrous) ..... AAA, Carbide

Cutting Tools (Fine Precision Boring & Finishing, Cast Iron, Nonferrous) ..... AA, Carbide

Cutting Tools (General Purpose, Cast Iron, Nonferrous) ..... A, Carbide

Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous) ..... B, Carbide

Cutting Tools (Heavy or Interrupted Cuts, Cast Iron, Nonferrous) ..... BB, Carbide

Cutting Tools (Precision Boring & Turning, Steel) ..... CC, Carbide

Cutting Tools (Finishing & Semi-Finishing, Steel) ..... C, Carbide

Cutting Tools (General Purpose, Steel) ..... D, Carbide

Cutting Tools (Heavy or Interrupted Cuts, Steel) ..... DD, Carbide

Cutting Tools (Finishing & Light Roughing, with or without Interrupted Cuts, Steel) ..... 548, Carbide

Cutting Tools (Heavy Roughing & Interrupted Cuts, Severe Conditions, Steel) ..... 434, Carbide

Cutting Tools (Shaping, Planing, Shock Applications, Steel) ..... 474, Carbide

Cutting Tools (Extremely Heavy Roughing or High Shock Interrupted Cuts, Suitable Hot Working & Removal of Hot Welding Flash) ..... GG, Carbide

Cutting Tools (Woodworking—Small Tips, Simple Form Tools) ..... A, Carbide

Cutting Tools (Woodworking—Large Tips, Intricate Forms) ..... B, Carbide

Dies (Fine Wire Drawing, Nonferrous, Coated Ferrous) ..... AAA, Carbide

Dies (Small Diameter Steel Drawing, Nonferrous Drawing Over 0.020 in., Compacting) ..... A, Carbide

Dies (Fine Wire Drawing, Light Cupping, Light Deep Drawing, Light Blanking, Compacting, Small & Medium Wire Straightening) ..... B, Carbide

Dies (Cold Drawing Steel Rods-Bars-Tubing, Deep Drawing & Cupping, Blanking, Light Heading & Cold Extrusion, Quills & Cut-Off Knives, Medium & Large Wire Straightening, Tube Drawing Mandrels) ..... BB, Carbide

Dies (Lamination, Heading & Cold Extrusion, Small Nail Gripper, Large Tube Drawing Mandrels, Punches, Medium Shock Applications) ..... HD-15, Carbide

Dies (Heading, Smaller Swaging, Large Nail Gripper, Heavy Bolt Sizing & Cold Heading Hammers, Punches with Unsupported Sections, High Shock Applications) ..... HD-20, Carbide

Dies (Same Applications as HD-20 Carbide, Used Only If Galling & Seizing is Problem) ..... HD-20-T, Carbide

Dies (Large Size Cold Heading & Swaging, Large Nail Gripper, Maximum Shock Applications) ..... HD-25, Carbide

Dies (Same Applications as HD-25 Carbide, Use Only if Galling & Seizing is Problem) ..... HD-25-T, Carbide

Mining & Rock Drilling (All Materials, Superior Shock Resistance, Excellent Wear Resistance) ..... 502, Carbide

Mining & Rock Drilling (All Applications Where Wear Resistance Is More Important Than Shock Resistance) ..... 589, Carbide

Wear Resistance Parts (Superior Wear Resistance, Use Where Absolutely No Shock Encountered) ..... AAA, Carbide

Wear Resistance Parts (Excellent Wear Resistance, Use Where No Shock Encountered) ..... AA, Carbide

Wear Resistance Parts (Use Where Not Much Shock Encountered) ..... A, Carbide

Wear Resistance Parts (Use Where Light to Medium Shock and Light Impact Encountered) ..... B, Carbide

Wear Resistance Parts (Use Where Heavy Shock Encountered) ..... BB, Carbide

Wear Resistance Parts (Use Where Heavy Shock and Medium Impact Encountered) ..... HD-15, Carbide

ALLEGHENY LUDLUM STEEL CORP., 2020 Oliver Bldg., Pittsburgh 22, Pa. — Listing No. 3

Bushings (Cold Work, Forming Dies and Gages)	FCC-EZ Graphitic Oil Hardening	O6	C 1.30, Cr .25, Mn 1.00, Si 1.40, Mo .25	Oil Mach. 1.25 Movement +A
Bushings (Cold Work, Forming Dies and Gages)	OILGRAPH Graphitic Oil Hardening	O6	C 1.35, Mn 1.00, Cr .25, Mo .25, Si 1.35	Oil Mach. 125 Movement +A
Bushings (Pneumatic chisels, Air Gun Bushings)	LUDLUM 602 Water, Oil Hardening	S5	C .50, Mn .70, Mo .40, V .10, Si 1.70	Water, Oil Mach. 85 Movement —C
Carbon Drills, Reamers	CROW Water Hardening		C 1.20, Mn .25, Cr .50, Si .25	Water Mach. 100 Movement —C
Cold Forming Dies	CARMET CA-12, Carbide			
Cold Header Dies	CARMET CA-11, Carbide			
Cold Header Dies	CARMET CA-20, Carbide			

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movemost in Hardening.
Cold Header Dies	CARMET CA-225, Carbide			
Cold Header Dies	POMPTON Water Hardening	W1	C .90-1.00	Water Mach. 100 Movement —C
Cold Header Dies	PYTHON Water Hardening	W2	C .90, Mn .30, V .25, Si .25	Water Mach. 85 Movement —C
Cold Work (Dies, Rolls, Cams, etc.)	ALHEAD Water Hardening		C 1.00, W 1.50, Co 1.50	Water Mach. 80 Movement C
Cold Work (Dies, Rolls, Cams, etc.)	FCC Air Hardening Cast-to-Shape Air Hardening	D2	C 1.50, Mn .40, Cr 12.00, Mo .80, V .50, Co .75, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FCC Air Hardening Forging Air Hardening	D2	C 1.50, Mn .40, Cr 12.00, Mo .80, V .50, Co .75, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, etc.)	FCC ROLOY Cast-to-Shape Air Hardening	D2	C 1.50, Mn .40, Cr 12.00, Mo 1.15, V .50, Co .75, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FCC 66 Cast-to-Shape Air Hardening	D5	C 1.50, Mn .40, Cr 12.00, Mo .95, V .50, Co 3.25, Si .40	Still Air Mach. 50 Nonshrink
Cold Work (Dies, Rolls, Cams, etc.)	FCC 66 Forgings Air Hardening	D5	C 1.50, Mn .40, Cr 12.00, Mo .95, V .50, Co 3.25, Si .40	Still Air Mach. 50 Nonshrink
Cold Work Dies	AIRLOY Air Hardening		C 1.00, Mn 3.00, Cr 1.00, Mo 1.00, Si .25	Air Mach. 60 Movement +A
Cold Work Dies (Blanking)	CARMET CA-10, Carbide			
Cold Work Dies (Blanking)	CARMET CA-11, Carbide			
Cold Work Dies (Blanking, Long Runs)	HURON Oil Hardening	D3	C 2.00, Mn .25, Cr 12.00, V .80, Si .25	Oil Mach. 45 Movement +A
Cold Work Dies (Brick Molds)	HURON V Air, Oil Hardening		C 2.50, Cr 12.00, Mo .80, V 4.00	Air, Oil Mach. 40 Movement A
Cold Work Dies (Blanking, Forming)	FCC ROLOY #2 Cast-to-Shape Air Hardening	A2	C 1.00, Mn .35, Cr 5.25, Mo 1.15, V .50, Si .35	Air Mach. 65 Movement A
Cold Work Dies (Blanking, Forming)	UTICA Water, Oil Hardening		C 1.25, Mn .30, Cr .40, W 1.40, V .20, Si .35	Oil, Water Mach. 65 Movement +A
Cold Work Dies (Blanking, Forming, Long Runs)	ONTARIO Air Hardening	D5	C 1.50, Mn .35, Cr 12.00, Mo .80, V .25, Si .30	Air Mach. 50 Movement +A
Cold Work Dies (Blanking, Forming, Short Runs)	DEWARD Oil Hardening	O2	C .90, Mn 1.50, Mo .30, Si .25	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Forming, Short Runs)	SAGAMORE Air Hardening	A2	C 1.00, Mn .50, Cr 5.00, Mo 1.00, V .25, Si .25	Air Mach. 65 Movement A
Cold Work Dies (Blanking, Forming, Short Runs)	SARATOGA Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, Si .35	Oil Mach. 85 Movement +A
Cold Work Dies (Blanking, Forming, Jigs and Fixtures)	TIOGA Oil Hardening	L6	C .70, Mn .60, Si .25, Cr .65, Ni 1.50, Mo .15	Oil Mach. 75 Movement +B
Cold Work Dies (Inserts, Machine Parts)	FCC Cast Tool Steel	W1	C .90, Mn .50, Si .30	Should not be Hardened Mach. 90
Cold Work Dies (and Machine Parts)	FCC FLAMHARD Cast-to-Shape Oil Hardening		C .50, Mn 1.15, Cr 1.20, Mo .40, V .10, Si .50	Oil Mach. 85 Movement B
Cutting Tools (Finishing)	ALX Cast Alloy		C 2.00, Cr 33.00, W 17.00, Co 40.00	
Cutting Tools (Finishing—Cast Iron, Nonferrous, Nonmetallics)	CARMET CA-4, Carbide			
Cutting Tools (Finishing—Nonferrous, Nonmetallics)	CARMET CA-7, Carbide			
Cutting Tools (Finishing—Nonferrous, Nonmetallics)	CARMET CA-8, Carbide			
Cutting Tools (Finishing Steel)	CARMET CA-606, Carbide			
Cutting Tools (Finishing Steel)	CARMET CA-608, Carbide			
Cutting Tools (Heavy Rough Cuts—Cast Iron)	CARMET CA-61, Carbide			
Cutting Tools (Precision Finishing Steel)	CARMET CA-605, Carbide			
Cutting Tools (Roughing)	PANTHER SPECIAL High Speed	T4	C .75, Mn .25, Cr 4.00, W 19.00, V 1.00, Co 5.00, Si .25	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	PANTHER 5 High Speed		C 1.50, Cr 4.75, W 12.50, Va 5.00, Co 5.00	Oil, Air, Salt Mach. 40 Movement A
Cutting Tools (Roughing)	SUPER DBL High Speed	M36	C .80, Mn .40, Cr 4.00, W 5.50, Mo 4.25, V 1.75, Co 7.75, Si .40	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	SUPER PANTHER High Speed	T5	C .80, Mn .25, Cr 4.00, W 19.00, Mo .75, V 2.00, Co 7.00, Si .25	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing—Cast Iron, Nonferrous, Nonmetallics)	CARMET CA-3, Carbide			
Cutting Tools (Heavy Interrupted Roughing)	CARMET CA-610, Carbide			
Cutting Tools (Roughing Steel)	CARMET CA-609, Carbide			
Cutting Tools (Roughing, Finishing)	DBL-2 High Speed	M2	C .80, Mn .25, Cr 4.00, W 6.00, Mo 5.00, V 1.75, Si .30	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing and Finishing)	DBL-3 High Speed	M3	C 1.15, Cr 4.00, W 6.00, Mo 5.50, Va 3.00	Oil, Air, Salt Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	LMW High Speed	M1	C .80, Mn .25, Cr 4.00, W 1.50, Mo 8.00, V 1.00, Si .30	Oil Mach. 55 Movement +A
Cutting Tools (Roughing, Finishing)	LXX High Speed	T1	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .25	Oil, Air Mach. 50 Movement +A
Cutting Tools (Roughing, Finishing)	ML High Speed	T2	C .80, Mn .30, Cr 4.00, W 18.00, Mo .75, V 2.00, Si .30	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	VLM High Speed		C .85, Mn .30, Cr 4.00, Mo 8.00, V 2.00, Si .30	Oil Mach. 55 Movement +A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Die Casting Dies	FCC 6 Forgings — Oil Hardening		C .37, Mn .80, Cr .95, V .17, Si .30	Oil Mach. 85 Movement B
Die Casting Dies	POTOMAC M — Oil, Air Hardening	H11	C .35, Mn .35, Si 1.10, Cr 5.25, Mo 1.25, V 1.00	Oil, Air Mach. 10 Movement —A
Draw Dies	CROW — (Listed Above)			
Draw Dies	ONTARIO — (Listed Above)			
Gages	CARMET CA-3, Carbide			
Gages	CARMET CA-4, Carbide			
Gages	CARMET CA-815, Chrome Carbide			
Gages	DEWARD — (Listed Above)			
Gages	ONTARIO — (Listed Above)			
General Purpose Carbon Tool Steel. (Not subject to test)	CORINTH — Water Hardening		Straight Carbon	Water Mach. 100 Movement —C
General Purpose Carbon Tool Steel.	POMPTON — (Listed Above)			
High Stress, High Wear Machine Parts & Hot Forming (Short Run)	FCC CMS Cast-to-Shape — Oil Hardening		C .60, Mn .70, Cr 1.00, Mo .40, V .10, Si .40, Ni .45	Oil or Air Mach. 85 Movement B
High Wear Machinery Parts, Liners.	FCC Nitri-Cast-Iron		C 2.70, Cr 1.00, Mn .70, Si 2.75, Mo .25, Al 1.00	Not Hardened, Nitride Only
Hot Work Dies (Brass and Aluminum Extrusion)	CARMET CA-815 — (Listed Above)			
Hot Work Dies (Hot Forming)	ATLAS A — Oil, Air Hardening	H21	C .30, Mn .30, Cr 3.00, W 9.00, V .50, Si .25	Oil, Air Mach. 70 Movement +B
Hot Work Dies (Hot Forming)	ATLAS B — Oil, Air Hardening		C .40, Mn .30, Cr 3.00, W 11.50, V .50, Si .25	Oil, Air Mach. 70 Movement +B
Hot Work Dies (Hot Forming)	FCC 5X1 Cast-to-Shape — Oil, Air Hardening	H12	C .32, Mn .35, Cr 5.00, W 1.35, Mo 1.35, V .25, Si 1.05	Oil or Air Mach. 70 Movement B
Hot Work Dies (Hot Forming Gen'l Purpose Hot Work)	POTOMAC — Oil, Air Hardening	H12, H13	C .32, Mn .30, Cr 5.00, W 1.25, Mo 1.50, V .25, Si .90	Oil, Air Mach. 70 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	FCC 5X1 Forgings	H12	C .32, Mn .35, Cr 5.00, W 1.35, Mo 1.35, V .25, Si 1.05	Oil, Air Mach. 60 Movement —A
Hot Work Dies (Hot Forming Extrusion Liners)	FCC 14 Forgings — Oil, Air Hardening	H21	C .30, Mn .25, Cr 4.00, W 9.75, V .25, Si .20	Oil or Air Mach. 70 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	FCC #19	H14	C .30-.40, Cr 4.00-5.50, Mn .25-.40, Si .80-1.75, W 3.75-4.25, V .20-.35	Oil Mach. 70
Hot Work Dies (Hot Forming Extrusion Liners)	5X1-V	H-13	C .40, Mn .35, Mo 1.25, V 1.00, Cr 5.00, Si 1.05	Oil, Air Mach. 60 Movement A
Hot Work Dies (Hot Forming Extrusion Liners)	5X1-Special	H-21	C .33, Cr 2.75, Mn .25, V .25, Si .30, In 9.75, Ni 1.75, Mo .25	Oil, Air Mach. 45 Movement A
Hot Work Dies (Hot Punching)	SEMINOLE Medium — Oil Hardening	S1	C .42, Mn .30, Cr 1.30, W 2.00, V .25, Si .25	Oil Mach. 85 Movement +B
Hot Work Dies (Hot Punching, Shearing)	EB ALLOY — Oil, Air Hardening		C .75, Mn .30, Cr 3.75, Mo .50, V .35, Si .25	Oil, Air Mach. 75 Movement +B
Hot Work Dies (Hot Punching, Shearing)	MOHAWK — Oil, Air Hardening	H25	C .45, Mn .30, Cr 3.50, W 14.00, V .70, Si .30	Oil, Air Mach. 60 Movement +A
Hot Work Dies	B-47		C .40, Cr 4.25, W 4.25, Co 4.25, V 2.25, Mo .40	Oil, Air Mach. 65 Movement A
Plastic Mold Die Hubs	LUDLUM 609	S5	C .60, Mn .80, Cr .25, Mo .25, V .20, Si 2.00	Oil, Water Mach. 80 Movement —C
Plastic Mold Die Hubs	SEMINOLE HARD — Oil Hardening		C .52, Mn .30, Cr 1.30, W 2.00, V .25, Si .90	Oil Mach. 85 Movement +B
Plastic Mold Die Hubs	ONTARIO, SAGAMORE.	(Listed Above)		
Shock Resisting (General Purpose)	SEMINOLE HARD — Oil Hardening	(Listed Above)		
Shock Resisting (Intermittent Impact)	ATLAS 93 — Oil Hardening		C .55, Mn .55, Cr .70, Mo .40, Si .20	Oil Mach. 90 Movement +B
Shock Resisting (Intermittent Impact) (Punching and Shearing)	LUDLUM 609 — Water, Oil Hardening	(Listed Above)		
Shock Resisting (Intermittent Impact)	PYTHON	(Listed Above)		
Shock Resisting (Repeated Impacts)	LUDLUM 602	(Listed Above)		

AMALGAMATED STEEL CORP., Broadway and Wire Ave., Cleveland 5, O. — Listing No. 4

Cold Work Dies (Blanking, Cold Forming)	MAL-DIE — Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, V .25, Mo 1.10	Air
Diecasting Dies	KROPUNCH — Air Hardening		Special Analysis	Air
Diecasting Dies	KROTUNG — Air Hardening	H12	C .33, Cr 4.75, W 1.30, Mo 1.50, V .25, Si .90	Air
Dies, Tools	DYKROME — Air Hardening	D2	C 1.50, Cr 11.50, Mo .75, V .25	Air
Dies, Tools	DYMAL — Oil Hardening	O1	C .90, Mn 1.15, Cr .50, W .50	Oil
Gages	(See DYMAL Listed Above)			
General Use—Tool Room	T.R.S. — Water, Oil Hardening		Special Analysis	Water, Oil
High Stress, High Wear Machinery Parts	NON-TEMPERING — Water, Oil Hardening	S6A	C .35, Mn .75, Si .35, Cr .80, W .25, Mo .50	Water, Oil
High Stress, High Wear Machinery Parts	(See T.R.S. Listed Above)			

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
Hot Work Dies	(See KROTUNG Listed Above)			
Hot Work Dies (Hot Punching)	SUPER SHOCK Oil Hardening	S1	C .50, Si .75, Cr 1.15, V .20, W 2.50	Oil
Machinery Parts	(See T.R.S., NON-TEMPERING Listed Above)			
Plastic Molding Master Hobs	(See SUPER SHOCK Listed Above)			
Punches, Dies, Slitters	(See KROPUNCH Listed Above)			
Punching & Shearing	DURO-CHIP Water, Oil Hardening	S5	C .55, Mn .80, Si 2.00, V .20, Mo .45	Water, Oil
Shock Resisting Tools (Intermittent Impact)	(See NON-TEMPERING Listed Above)			
Shock Resisting Tools (Repeated, Intermittent Impact)	(See SUPER SHOCK, T.R.S., NON-TEMPERING Listed Above)			
Special Purpose (Shock Resisting)	(See NON-TEMPERING Listed Above)			

ANCHOR DRAWN STEEL CO., See Vanadium-Alloy Steel Co., (Listing No. 61)

ARMSTRONG BROS. TOOL CO., 5200 W. Armstrong Ave., Chicago 30, Ill. — Listing No. 5

Cutting Tools (Finish & Light Roughing, Steel)	ARMIDE (78 Carbide)		
Cutting Tools (General Purpose Machining, Steel)	ARMIDE (78B Carbide)		
Cutting Tools (General Purpose, Cast Iron, Nonferrous)	ARMIDE (883 Carbide)		
Cutting Tools (Light Roughing and General Finishing, Steel)	ARMIDE (350 Carbide)		
Cutting Tools (Heavy Roughing of Steel)	ARMIDE (370 Carbide)		
Cutting Tools (General Purpose Roughing and Finishing of Steel, Cast Iron and Nonferrous Metals)	ARMALOY		Cast Cobalt, Chromium, Tungsten Alloy
Cutting Tools (General Purpose)	ARMSTRONG		High Speed Steel M-2
Cutting Tools (Roughing)	ARMSTRONG		High Speed Cobalt M-34

ASSOCIATED STEEL CO., 4545 Hough Ave., Cleveland 3, O. — Listing No. 6

Brake Dies (Heat Treated)	KROMITE BRAKE DIE		
Cold Work Dies	MOLEX #7		Oil Movement B
Cold Work Dies	MOLEX #8		Air Movement A
Cold Work Dies	MOLEX GROUND STOCK		Air, Oil Movement A
Cutting Dies	MOLEX TUBING		Oil Movement A
Hand Tools	ALTO		Water
Heat Treated Shafting	MIRRALLOY		
High Stress Machine Parts (Heat Treated)	KROMITE #3		Oil Movement B
Pneumatic Tools	ALTOLOY		Oil

ATLANTIC STEEL CORP., 1775 Broadway, New York 19, N. Y. — Listing No. 7

Cold Work (Blanking)	ATLAN Oil Hardening		C .90, Mn 1.15, Cr .50, W .50	Oil
Cold Work (Blanking)	ATLANTIC DIE Oil Hardening		C .70, Mn .40, Cr 1.00, Si .20, Ni 1.65	Oil
Cold Work (Blanking)	ATLAN HCC Oil and Air Hardening		C 1.50, Cr 12.00, Mo .80, V 1.00	Air or Oil
Cold Work Dies (Blanking, Cold Forming)	ATSCO Water Hardening		C .75/1.10	Water
Cold Work	ATLOY 2		C .40, Mn .85, Si .35, Cr 1.00, Ni 1.00, Mo .45	Oil
Punching & Shearing	ATSIL Water, Oil Hardening		C .50, Mn .60, Mo .40, W .50, Si 1.35	
Punching & Shearing	TUNCRO Oil Hardening		C .50, Mn .25, Cr 1.40, W 2.00, V .25, Si .25	Oil
Punching & Shearing	(See ATLANTIC DIE, ATLAN HCC, Listed Above)			
Shock Resisting	ATLANTIC 33		C .33, Mn .40, Cr .75, Mo .75, Cu .75, Si .65	Water

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
ATLAS STEELS LTD., E. Main St., Welland, Ont., Canada.				**Listing No. 8**
Cold Work Dies (Blanking, Cold Forming)	ATLAS REFINED 10 Water Hardening	W1	C 1.00, Mn .25, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Cold Forming)	ATLAS X10 Water Hardening	W1	C 1.05, Mn .20, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Blanking)	BADGER Oil Hardening		C 1.25, Mn .25, Cr .50, W 1.50, V .20, Si .25	Oil Mach. 85 Movement +A
Cold Work Dies (Blanking, Cold Forming)	CRO-MO-LOY Air Hardening	A2	C 1.00, Mn 1.00, Cr 5.00, Mo 1.00, V .25, Si .30	Air Mach. 85 Movement +A
Cold Work Dies (Blanking, Cold Forming)	FNS Air Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .80, V .25, Si .30	Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Cold Forming)	KEEWATIN Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, Si .30	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Cold Forming)	NN Oil Hardening	D3	C 2.25, Mn .30, Cr 12.50, V .25, Si .25	Oil Mach. 40 Movement +A
Cold Work Dies (Cold Forming)	ATLAS SPEC. ALLOY 10 Water Hardening	W2	C 1.05, Mn .20, V .20, Si .20	Water Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATLAS XXX Water Hardening		C 1.35, Mn .30, Cr .35, W 3.75, Si .30	Water Mach. 75 Movement —C
Cold Work Dies (Cold Forming)	ATLAS XX95 Water Hardening	W1	C .95, Mn .30, Si .30	Water Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATLAS X12 Water Hardening	W1	C 1.20, Mn .25, Si .20	Water Mach. 100 Movement —C
Cutting Tools (Finishing)	ATLAS "Q" Water Hardening		C 1.20, Mn .25, Cr .50, Si .20	Water Mach. 95 Movement —C
Cutting Tools (Finishing)	DENINE Water Hardening		C 1.25, Mn .25, W 1.40, Si .25	Water Mach. 90 Movement —C
Cutting Tools (Finishing)	TROJAN High Speed	T2	C .80, Mn .25, Cr 4.00, W 18.50, Mo .50, V 2.00, Si .30	Oil, Air Mach. 45 Movement +A
Cutting Tools (Finishing)	(See ATLAS X12, BADGER, XXX, Listed Above)			
Cutting Tools (Roughing)	MOHICAN High Speed	M1	C .80, Mn .25, Cr 4.00, W 1.50, Mo 9.00, V 1.20, Si .30	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing)	NIPIGON High Speed	T5	C .78, Mn .25, Cr 4.00, W 19.00, Mo .80, V 2.00, Co 8.00, Si .30	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	POWHATAN High Speed	T4	C .75, Mn .25, Cr 4.00, W 19.00, V 1.25, Co 5.00, Si .30	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	SABRE		C 1.25, Mn .30, Si .30, W 9.75, Cr 4.25, Mo 2.50, V 4.10, Co 5.50	Oil, Air Mach. 45 Movement A
Cutting Tools (Roughing)	SIXIX High Speed	M2	C .82, Mn .25, Cr 4.00, W 6.50, Mo 5.00, V 2.00, Si .30	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing)	SPARTAN 7 High Speed	T1	C .72, Mn .25, Cr 4.00, W 18.00, V 1.20, Si .30	Oil, Air Mach. 50 Movement +A
Diecasting Dies	ATLAS DIE Casting Steel Oil Hardening		C .40, Mn .75, Cr .60, Mo .15, Si .20, Ni 1.25	Oil Mach. 100 Movement B
Diecasting Dies	CRODI Air Hardening	H11	C .35, Mn .40, Cr 5.00, Mo 1.40, V .40, Si 1.00	Air Mach. 75 Movement A
Diecasting Dies	HODI Air Hardening		C .23, Mn .30, Cr 3.25, W 9.50, V .40, Si .30	Oil, Air Mach. 70 Movement +A
Diecasting Dies	RED INDIAN Air Hardening		C .35, Mn .30, Cr 5.00, W 4.50, Mo .30, V .30, Co .50, Si 1.00	Air Mach. 75 Movement A
Diecasting Dies	SENECA Oil, Air Hardening	H21	C .35, Mn .30, Cr 3.25, W 9.50, V .40, Si .30	Oil, Air Mach. 70 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	SPARTAN 5 Oil, Air Hardening		C .50, Mn .30, Cr 4.00, W 18.00, V 1.00, Si .30	Oil, Air Mach. 55 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	ULTIMO 6 Oil, Air Hardening		C .55, Mn .55, Cr .75, Mo .75, Si .25, Ni 1.60	Oil Mach. 75 Movement A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See CRODI, RED INDIAN, SENECA, Listed Above)			
Plastic Molding Dies (Ejector Pins)	FALCON 6 Oil Hardening	S1	C .55, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil Mach. 80 Movement +B
Plastic Molding Dies (Ejector Pins)	MONARK 2 Water Hardening	S5	C .60, Mn .75, Cr .30, Mo .20, Si 2.00	Oil Mach. 80 Movement —B
Plastic Molding Dies (Ejector Pins)	ATLAS X12 (Listed Above) Water Hardening			
Plastic Molding Dies (Hubs)	(See CRO-MO-LOY, FALCON 6, FNS, KEEWATIN, MONARK 2, NN)			
Plastic Molding Dies (Hubbed Cavity Dies)	ATLAS HOBBING IRON Water Hardening		C .05, Mn .20, Si .15	Water Movement —B
Plastic Molding Dies (Hubbed Cavity Dies)	IMPACTO Water Hardening		C .16, Mn .50, Mo .25, Si .20, Ni 1.75	Oil Movement —B
Plastic Molding Dies (Machine Cut Cavities)	SUPRIMPACTO Oil Hardening		C .12, Mn .50, Cr 1.50, Si .20, Ni 3.75	Oil Mach. 100 Movement —B
Plastic Molding Dies (Machine Cut Cavities)	(See CRO-MO-LOY, KEEWATIN Listed Above)			
Punching and Shearing	ATLAS REFINED 8 Water Hardening	W1	C .80, Mn .25, Si .20	Water Mach. 100 Movement —C
Punching and Shearing	FALCON 4 Oil Hardening		C .45, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil Mach. 80 Movement +B
Punching and Shearing	(See ATLAS XXX, ATLAS X10, FALCON 6, FNS, MONARK 2, NN, ULTIMO 6)			
Shock Resisting (Intermittent Impact)	ATLAS ALPHA 8 Water Hardening		C .80, Mn .25, Si .20, Cr-W-Mo-V higher than normal residuals	Water Mach. 100 Movement —C

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
Shock Resisting (Intermittent Impact)	MAPLE LEAF Water Hardening		C .80, Mn .30, Si .25, Cr-W-Mo-V higher than normal residuals	Water Mach. 100 Movement —C
Shock Resisting (Repeated Impact)	ATLAS SPECIAL ALLOY S Water Hardening	W2	C .80, Mn .20, V .20, Si .30	Water Mach. 100 Movement —C
Shock Resisting (Repeated Impact)	(See ATLAS REFINED S, FALCON 4, FALCON 6, MONARK 2)			

BEDFORD TOOL & FORGE CO., 22 Interstate St., Bedford, O. — Listing No. 9

Shock Resisting	BEDCO ALLOY		C .55, Mn 1.00, Si 2.00, Mo .40, Va .35	Water, Oil, Air blast, Still air Mach. 50 Movement C
Shock Resisting	BTF ALLOY		C .55, Mn 1.00, Si 2.00, Mo .35, Chr .30	Water, Oil, Air blast, Still air Mach. 50 Movement C

BETHLEHEM STEEL CO., 701 E. Third St., Bethlehem, Pa. — Listing No. 10

Blacksmithing Tools	SOLID DRILL Water, Oil Hardening	W1	C .75, Mn .20, Si .15	Water, Oil Movement ±B
Cold Work Dies (Blanking, Cold Forming)	A-H5 Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air Mach. 70 Movement +A
Cold Work Dies (Blanking, Cold Forming)	BTR Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, V .20	Oil Mach. 90 Movement +B
Cold Work Dies (Blanking, Cold Forming)	BEST Water Hardening	W2	C .75-1.10, V .25-.25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	LEHIGH H Air Hardening	D2	C 1.55, Cr 11.50, Mo .80, V .40	Air Mach. 50 Movement +A
Cold Work Dies (Blanking, Cold Forming)	LEHIGH L Air Hardening	D1	C .85, Cr 11.50, Mo .45, V .30, Ni 1.00	Oil, Air Mach. 50 Movement ±A
Cold Work Dies (Blanking, Cold Forming)	LEHIGH S Oil Hardening	D3	C 2.05, Cr 11.50, V .60	Oil Mach. 45 Movement +B
Cold Work Dies (Blanking, Cold Forming)	SUPERIOR Water Hardening	W2	C .80-1.35, V .15-.25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	X Water Hardening	W1	C .75-1.10	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	XX Water Hardening	W1	C .90-1.30	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	XXX Water Hardening	W1	C .90-1.35	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Cold Forming)	XCL Water Hardening	W1	C .80-1.20	Water Mach. 100 Movement +C
Cutting Tools (Finishing)	HM High Speed	M1	C .78, Cr 3.90, W 1.60, Mo 8.50, V 1.05	Oil, Air Mach. 65 Movement ±A
Cutting Tools (Roughing)	COMOKUT High Speed	T4	C .74, Cr 4.50, W 18.25, Mo .75, V 1.25, Co 5.00	Oil, Air Mach. 55 Movement +A
Cutting Tools (Roughing, Finishing)	M-10 High Speed	M10	C .87, Cr 4.00, Mo 8.35, V 2.05	Oil, Air Mach. 60 Movement ±A
Cutting Tools (Roughing, Finishing)	SPECIAL HS High Speed	T1	C .73, Cr 4.00, W 18.00, V 1.10	Oil, Air Mach. 60 Movement ±A
Cutting Tools (Roughing, Finishing)	66HS High Speed	M2	C .83, Cr 4.15, W 6.35, Mo 5.00, V 1.50, S .15	Oil, Air Mach. 75 Movement ±A
Cutting Tools (Roughing, Finishing)	66S High Speed		C .83, S .15, W 6.35, Mo 5.00, Cr 4.15, V 1.50	Oil, Air Mach. 75 Movement ±A
Cutting Tools (Rough Drilling)	HOLLOW DRILL Water, Oil Hardening		C .75, Mn .20, Si .15	Water, Oil Movement ±B
Cutting Tools (Stone Drilling)	BROACHING & CHANNELLER Water Hardening		C .80, Mn .35, Si .25	Water Movement +C
Diecasting Dies	CR-MO-V Air Hardening	H11	C .38, Cr 5.25, Mo 1.25, V .45, Si 1.05	Air Mach. 75 Movement +A
Diecasting Dies	CR-MO-V (High V) Air Hardening	H13	C .38, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement +A
Diecasting Dies	CR-MO-W Air Hardening	H12	C .35, Cr 5.15, W 1.55, Mo 1.65, Si 1.05	Air Mach. 70 Movement +A
Diecasting Dies	CR-MO-W-V Air Hardening	H12	C .35, Si 1.05, Cr 5.15, Mo 1.55, W 1.25, V .30	Air Mach. 70 Movement +A
Diecasting Dies	MULTIMOLD Oil Hardening	P20	C .35, Mn .70, Cr .90, Mo .30, Si .45	Oil Mach. 80 Movement +B
Diecasting Dies	57 HW Air Hardening	H21	C .33, Cr 3.25, W 9.35, V .30	Air Mach. 65 Movement +A
Diecasting Dies	57 SPECIAL Air Hardening	H24	C .42, Cr 2.50, W 14.00, V .30	Air Mach. 60 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	HW8 Air Hardening	H43	C .60, Cr 3.60, Mo 8.50, V 1.75	Air Mach. 65 Movement +A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	SPECIAL HS-55	H26	C .55, Cr 4.00, W 18.00, V 1.10	Oil or Air Mach. 65 Movement ±A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See CR-MO-V, CR-MO-W, 57 HW, 57 SPECIAL Listed Above)			
Plastic Molding Dies (Hubbed Cavity)	DURAMOLD A Air Hardening	P4	C .07, Mn .35, Cr 4.50, Mo .50, Si .20	Air Mach. 80 Movement +A
Plastic Molding Dies (Hubbed Cavity)	DURAMOLD B Oil Hardening	P2	C .06, Mn .30, Cr .95, Mo .25, Si .15, Boron Added	Oil Mach. 80 Movement +B
Plastic Molding Dies (Hubbed Cavity)	DURAMOLD C Water Hardening	P1	C .06, Mn .15, Si .10	Water Mach. 40 Movement +C
Plastic Molding Dies (Machined Cavity)	DURAMOLD N Oil Hardening	P6	C 10, Mn .50, Cr 1.50, Si .25, Ni 3.50	Oil Mach. 80 Movement +B
Plastic Molding Dies (Machined Cavity)	DURAMOLD NI-CR Oil Hardening	P3	C .10, Cr .60, Ni 1.25	Oil Mach. 80 Movement +B
Plastic Molding Dies (Machined Cavity)	(See BTR, A-H5, MULTIMOLD Listed Above)			
Plastic Molded Dies (Hobs)	(See BTR, A-H5, LEHIGH H Listed Above)			
Plastic Molding (Master Hobs)	67 CHISEL Oil Hardening	S1	C .50, Cr 1.25, W 2.50, V .20, Si .75	Oil Mach 75 Movement +B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Press Brake Dies	BRAKE DIE Oil Hardening		C .50, Mn .90, Cr 1.00, Mo .20	Oil Mach. 100 Movement + B
Punching & Shearing	OMEGA Water, Oil Hardening	S5	C .60, Mn .70, Mo .45, V .20, Si 1.85	Oil, Water Mach. 65 Movement ± B
Punching & Shearing	T1 ALLOY Water, Oil Hardening	S4	C .65, Mn .90, Si 2.00	Oil, Water Mach. 65 Movement ± B
Punching & Shearing	(See X, XX, XXX, XCL, BEST, BTR, A-H3, LEHIGH H, LEHIGH L, LEHIGH S, 67 CHISEL, SUPERIOR Listed Above)			
Punching & Shearing	TOUGH M Oil Hardening	L2	C .45, Mn .55, Cr .95, V .20, Si .20	Oil Mach. 80 Movement + B
Shock Resisting Tools (Repeated Impact)	BEARCAT Air Hardening		C .50, Mn .70, Cr 3.25, Mo 1.40	Air Mach. 90 Movement + A
Shock Resisting Tools (Repeated Impact)	IMPERIAL Oil, Water Hardening	S2	C .50, Mn .70, Si .70, V .20, Mo .45	Oil, Water Mach. 75 Movement ± B
Shock Resisting Tools (Repeated, Intermittent Impact)	(See OMEGA, TOUGH M, 67 CHISEL, T1 ALLOY Listed Above)			
Special Purpose (Cold Work Dies)	BETHALLOY Oil Hardening	L6	C .75, Mn .75, Cr .90, Mo .35, Ni 1.50	Oil Mach. 85 Movement + B
Special Purpose (Cutting Tools)	67 TAP Oil Hardening	O7	C 1.25, Cr .65, W 1.40, V .20	Oil Mach. 60 Movement + B
Special Purpose (Cutting Tools)	BFS Water Hardening	F2	C 1.30, Mn .25, W 3.50	Water Mach. 70 Movement + C
Special Purpose (Shock Resisting)	NON-TEMPERING Water, Oil Hardening		C .35, Mn .70, Cr .80, Mo .30, Si .45, Cu .30	Water, Oil Mach. 80 Movement ± B
Special Purpose (Shock Resisting)	PISTON Water Hardening		C 1.15, Cr .55, V .20	Water Mach. 80 Movement + C
Special Purpose (Shock Resisting and Cold Work Dies)	CR-MO-W-55 Air, Oil Hardening		C .55, Mn .30, Si .90, Cr 5.10, Mo 1.45, W 1.25	Air Mach. 70 Movement + A

BISSETT STEEL CO., 945 E. 67th St., Cleveland 3, O. — Listing No. 11

Cold Work Dies (Blanking, Cold Forming)	BISCO TOOL STEEL TUBING Oil Hardening	C 1.00, Mn 1.00, Cr 1.50, Mo .20	Oil
Cold Work Dies	AIRPRO Air Hardening	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25, Si .20	Air
Cold Work Dies	OILTEMP Oil Hardening	C .90, Mn 1.10, Cr .50, W .50, V .20	Oil
Cutting Tools (Finishing)	CARBON Water Hardening	C As Desired, Mn .25, Si .20	Brine
Cutting Tools (Finishing)	CARVAN Water Hardening	C As Desired, Mn .25, V .25, Si .20	Brine
Cutting Tools (Finishing)	TIGER VAN High Speed	C .80, Cr 4.25, W 18.50, Mo .50, V 2.10	Oil
Cutting Tools	BISMO M-2 High Speed	C .82, Cr 4.00, W 6.50, Mo 5.00, V 1.90	Oil
Cutting Tools	BISMO M-3 High Speed	C 1.00, Cr 4.00, W 6.25, Mo 6.25, V 2.40	Oil
Cutting Tools	BISMO 8-4-1 High Speed	C As Desired, Cr 4.00, W 1.50, Mo 8.50, V 1.15	Oil
Cutting Tools	SUPER TIGER High Speed	C .80, Cr 4.50, W 18.50, Mo .80, V 1.75, Co 7.50	Oil
Cutting Tools	TIGER BRAND High Speed	C As Desired, Cr 4.00, W 18.00, V 1.10	Oil
Cutting Tools	TIGER SPECIAL High Speed	C .75, Cr 4.25, W 18.00, Mo .50, V 1.10, Co 8.00	Oil
Diecasting (Aluminum)	GRIPMORE NO. 1 Air Hardening	C .35, Mn .35, Cr 5.00, Mo 1.00, V .40, Si 1.00	Air
Diecasting (Aluminum)	GRIPMORE NO. 1-V Air Hardening	C .35, Mn .35, Cr 5.00, Mo 1.00, V 1.10, Si 1.00	Air
Hot Work Dies	CHECKNO NO. 1 Oil Hardening	C .45, Mn .25, Cr 3.50, W 13.25, Si .20	Oil
Hot Work Dies	CHECKNO NO. 2 Oil Hardening	C .35, Mn .25, Cr 3.50, W 11.00, V .45, Si .20	Oil
Hot Work Dies	CHECKNO NO. 3 Oil Hardening	C .28, Mn .30, Cr 3.25, W 8.50, V .30, Si .30	Oil
Hot Work Dies	CROMVA Water, Oil Hardening	C .35 or .50, Mn .60, Cr 1.00, V .20	Water, Oil
Hot Work Dies	HYPRO A Oil, Air Hardening	C .35, Mn .60, Cr 7.50, W 7.50, Si 1.50	Oil, Air
Hot Work Dies	HYPRO B Air Hardening	C .35, Mn .25, Cr 5.25, W 5.25, Mo .20, V .20, Co .50, Si .90	Air
Hot Work Dies	WOCO Oil, Air Hardening	C .45, Cr 1.50, W 2.25, V .25	Oil
Hot Work Dies	GRIPMORE NO. 2 Air Hardening	C .35, Mn .35, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	Air
Punching, Shearing	ANNITE NO. 1 Oil Hardening	C 2.25, Mn .30, Cr 13.00, V .30, Si .25	Oil
Punching, Shearing	ANNITE NO. 2 Air Hardening	C 1.50, Mn .30, Cr 11.50, Mo .80, V .25, Si .25	Air
Shock Resisting	CROMO Oil Hardening	C .55, Mn .50, Cr 1.00, Mo .35	Oil
Shock Resisting	SILIMO Water, Oil Hardening	C .50, Mn .45, Mo .50, V .20, Si 1.10	Water, Oil
Shock Resisting	SILICARB Water, Oil Hardening	C .55, Mn .75, Mo .20, Si 2.00	Water, Oil
Shock Resisting	(See CROMVA, WOCO, Listed Above)...		

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

BLACKALLOY CO. of AMERICA, Central Terminal Bldg., 415 Lexington Ave., New York 17, N. Y. — Listing No. 12

Cutting Tools	BLACKALLOY, Type #525			Mach. 0

H. BOKER & CO. INC., 101 Duane St., New York 7, N. Y. — Listing No. 13

Blanking and Forming Dies	KINITE (Air Hardening) In Rolled, Bars and Casting form		C 1.52, Mn .54, Cr 12.74, Mo .98, V .60, Co .57, Si .47	Air (High Speed) Movement A
Cutting Tools	NOVO SUPERIOR High Speed		C .72, Mn .24, Cr 4.14, W 18.36, V 1.08, Si .27	Oil (High Speed) Movement A
Cutting Tools	TWIN MO High Speed		C .84, Si .25, Mn .25, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil Mach. (High Speed)
Dies	OILWAY Oil Hardening		C .94, Mn 1.23, Cr .44, W .57	Oil See (*) Movement A

* Same as carbon water hardening steel.

BRAEBURN ALLOY STEEL CORP., Braeburn, Pa. — Listing No. 14

Cold work Dies (Blanking, Cold Forming)	AIRQUE Air Hardening	A2	C 1.00, Mn .70, Cr 5.25, Mo 1.15, V .25, Si .30	Air Movement A
Cold work Dies (Blanking, Cold Forming)	EXTRA Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Movement C
Cold work Dies (Blanking, Cold Forming)	KISKI Oil Hardening	O1	C .95, Mn 1.10, Cr .50, W .60, V .20, Si .30	Oil Movement A
Cold work Dies (Blanking, Cold Forming)	SPECIAL V Water Hardening	W2	C 1.00, Mn .25, V .20, Si .25	Water Movement C
Cold work Dies (Blanking, Cold Forming)	SUPERIOR 1 Oil Hardening	D3	C 2.15, Mn .50, Cr 12.50, V .60, Si .30	Oil Movement A
Cold work Dies (Blanking, Cold Forming)	SUPERIOR 3 Oil, Air Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .80, V .80, Si .30	Oil Movement A
Cutting Tools (Roughing)	BONDED CARBIDE High Speed	T6	C .70, Mn .25, Cr 4.50, W 18.50, Mo. 70, V 1.50, Co 12.00, Si .25	Oil Movement B
Cutting Tools (Roughing)	BONDED CARBIDE Jr. High Speed	T5	C .77, Mn .25, Cr 4.25, W 18.50, Mo .75, V 1.95, Co 7.60, Si .25	Oil Movement B
Cutting Tools (Roughing)	COBALT High Speed	T4	C .74, Mn .25, Cr 4.00, W 18.00, Mo .50, V 1.00, Co 5.00, Si .25	Oil Movement B
Cutting Tools (Roughing)	COMO High Speed	M30	C .77, Mn .25, Cr 4.00, W 1.55, Mo 8.50, V 1.20, Co 5.00, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	BRAEMOW High Speed	M2	C .82, Mn .25, Cr 4.20, W 6.50, Mo 5.00, V 1.90, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	BRAEVAN M-3 High Speed	M3	C 1.00, Mn .25, Cr 4.00, W 6.20, Mo 5.60, V 2.50, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	CONGO High Speed	M6	C .78, Mn .25, Cr 4.00, W 4.00, Mo 5.00, V 1.40, Co 12.00, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	MOCUT High Speed	M1	C .80, Mn .25, Cr 4.00, W 1.55, Mo 8.00, V 1.10, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	TWINVAN High Speed	T2	C .82, Mn .25, Cr 4.25, W 18.50, Mo .65, V 2.10, Si .25	Oil Movement B
Cutting Tools (Roughing, Finishing)	VINCO High Speed	T1	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .25	Oil Movement B
Die Casting Dies (Aluminum)	PRESSURDIE 3 Air Hardening	H13	C .39, Mn .30, Cr 5.50, Mo 1.10, V 1.00, Si 1.00	Air Movement A
Hot Work Dies (Punching, Forming)	PRESSURDIE 1 Air Hardening	H14	C .38, Mn .30, Cr 5.00, W 5.00, Mo .25, V .20, Co .50, Si .90	Air Movement A
Hot Work Dies (Punching, Forming)	T-ALLOY Oil, Air Hardening	H22	C .35, Mn .25, Cr 3.50, W 10.50, V .40, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "A" Oil, Air Hardening	H21	C .33, Mn .25, Cr 3.50, W 9.60, V .50, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "B" Oil, Air Hardening	H24	C .50, Mn .25, Cr 3.00, W 15.00, V .50, Si .25	Oil Movement B
Hot Work Dies (Punching, Forming)	T-ALLOY "C" Oil, Air Hardening	H25	C .25, Mn .25, Cr 4.00, W 15.00, V .50, Si .25	Oil Movement B
Hot Work Dies (Aluminum Punching and Forming)	PRESSURDIE 2 Air Hardening	H12	C .35, Mn .35, Cr 5.00, W 1.20, Mo 1.45, V .35, Si 1.00	Air Movement A
Shock Resisting	TRITON Water Hardening	S2	C .50, Mn .35, Mo .60, Si 1.00	Water Movement B
Shock Resisting	VIBRO Oil Hardening	S1	C .50, Mn .25, Cr 1.40, W 1.90, V .25, Si .25	Oil Movement B

CARBOLOY DEPT., GENERAL ELECTRIC CO., 11147 E. Eight Mile Rd., Detroit 32, Mich. — Listing No. 15

Cutting Tools (Finishing, Cast Iron, Nonferrous)	905 Carbide
Cutting Tools (Finishing & Light Roughing, Steel)	78 Carbide
Cutting Tools (Precision Finishing, Cast Iron, Nonferrous)	999 Carbide
Cutting Tools (Precision Finishing, Steel)	831 Carbide
Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous)	44A Carbide
Cutting Tools (General Purpose, Cast Iron, Nonferrous)	883 Carbide
Cutting Tools (General Purpose Machining, Steel)	78B Carbide
Cutting Tools (Light Roughing, Finishing, Steel)	350 Carbide
Cutting Tools (Heavy Duty Machining, Steel)	370 Carbide
Cutting Tools (Heavy Duty Metal Cutting, Shock Resistant)	55A Carbide
Mining Tools (Rotary & Percussion Type)	55A Carbide
Dies (Fine Wire Drawing)	44A Carbide
Dies (Fine Wire Drawing, Small Sizes Steel Wire)	999 Carbide
Dies (Wire Drawing)	779 Carbide
Dies (Deep Drawing)	55A Carbide
Dies (Blanking & Light Heading)	55B Carbide
Dies (Heavy Duty Heading)	190 Carbide
Mechanical Applications (Extreme Wear Resistance)	883 Carbide
Mechanical Applications (Wear & Light Shock Resistance)	44A Carbide
Mechanical Applications (High Strength, Wear & Shock Resistance)	55A Carbide

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Machining Alloy Cast Irons & Aluminum)	907 Carbide		Mechanical Applications (Wear, With Corrosion & Heat Resistance)	608 Chrome Carbide
Cutting Tools (Woodworking—Large Tips, Intricate Forms)	44A Carbide		Mechanical Applications (Heavy, Non-Cutting Metal For Rotors, Balance Weights)	Hevimet
Cutting Tools (Woodworking—Small Tips, Simple Form Tools)	883 Carbide		Mechanical Applications (Radio-Active Shielding)	Hevimet

CARPENTER STEEL CO., 339 W. Bern St., Reading, Pa. — Listing No. 16

Cold Work Dies (Cold Forming)	H-9 EXTRA Water Hardening	W1 (0.90C)	C .90, Mn .40, Si .40	Water Mach. 100 Movement ±C*
Cold Work Dies (Cold Forming)	SOLAR Water Hardening	S2	C .50, Mn .40, Mo .50, Si 1.00	Water Mach. 75 Movement ±C*
Cold Work Dies (Blanking, Cold Forming)	HAMPDEN Oil Hardening	D3	C 2.10, Mn .25, Cr 12.50, Si .25, Ni .50	Oil Mach. 50 Movement +A
Cold Work Dies (Blanking, Cold Forming)	K-W Water Hardening	F3	C 1.30, Mn .30, W 3.50, Si .30	Water Mach. 80 Movement —C
Cold Work Dies (Blanking, Cold Forming)	R.D.S. Oil Hardening	L6	C .70, Mn .35, Cr 1.00, Si .25, Ni 1.75	Oil Mach. 75 Movement +A
Cold Work Dies (Blanking, Cold Forming)	STENTOR Oil Hardening	O2	C .90, Mn 1.60, Si .25	Oil Mach. 100 Movement +A
Cold Work Dies (Blanking, Cold Forming)	VEGA Air Hardening	A4	C .70, Mn 2.00, Cr 1.00, Mo 1.35, Si .30	Air Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	No. 11 SPECIAL Water Hardening	W1 (1.00 C)	C 1.05, Mn .20, Si .20	Water Mach. 100 Movement ±C*
Cold Work Dies (Blanking, Cold Forming)	No. 484 Air Hardening	A2	C 1.00, Mn .70, Cr 5.00, Mo 1.00, V .20, Si .20	Air Mach. 70 Movement +A
Cold Work Dies (Blanking, Cold Forming)	No. 610 Air Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .80, V .90, Si .30	Air Mach. 50 Movement +A
Cutting Tools (Finishing)	K-W	(Listed above)		
Cutting Tools (Roughing, Finishing)	SPEED STAR High Speed, Hot Work Tool Steel	M2	C .82, Mn .25, Cr 4.25, W 6.25, Mo 5.00, V 1.90, Si .25	Oil Mach. 45 Movement +A
Cutting Tools (Roughing, Finishing)	STAR-ZENITH High Speed, Hot Work Tool Steel	T1	C .72, Mn .25, Cr 4.00, W 18.25, V 1.15, Si .20	Oil Mach. 45 Movement +A
Die Casting Dies (Hubbed Cavity Dies)	SUPER SAMSON		C .10, Mn .30, Cr 5.00, Mo .90, V .25, Si .20	Oil, Air Mach. 70 Movement ±A
Die Casting Dies	No. 883 Hot Work Tool Steel	H13	C .40, Mn .35, Cr 5.00, Mo 1.35, V .90, Si 1.10	Oil, Air Mach. 65 Movement ±B*
Die Casting Dies (Ejector Pins)	No. 883	(Listed above)		
Gages	T.G.S. Oil Hardening		C .20, Mn 1.30, Si .20	Oil Mach. 100 Movement +A
Gages		(See HAMPDEN, No. 11 Special, No. 484, No. 610, STENTOR, listed above)		
High Stress, High Wear Machinery Parts		(See T.G.S., R.D.S., listed above)		
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	T-K Hot Work Tool Steel	H21	C .35, Mn .30, Cr 3.50, W 9.00, V .40, Si .30	Oil, Air Mach. 55 Movement ±B*
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	No. 345 Hot Work Tool Steel	H12	C .35, Mn .45, Cr 5.00, W 1.25, Mo 1.50, V .25, Si 1.00	Oil, Air Mach. 65 Movement ±B*
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	No. 883	(Listed above)		
Hot Work Dies (Hot Punching, Hot Shearing)		(See SPEEDY STAR, STAR-ZENITH, listed above)		
Plastic Molding Dies (Ejector Pins)		(See No. 11 SPECIAL, SOLAR, STENTOR, listed above)		
Plastic Molding Dies (Hubs)	VEGA	(Listed above)		
Plastic Molding Dies (Hubbed Cavity Dies)	MIRROMOLD Water Hardening		C .10, Mn .20, V .10	Water Movement ±B*
Plastic Molding Dies (Machine Cut Cavity Dies)	No. 158 Oil Hardening		C .10, Mn .50, Cr 1.50, Ni 3.75, Si .20	Oil, Air Movement +B, +A
Plastic Molding Dies (Machine Cut Cavity Dies)	STENTOR	(Listed above)		
Plastic Molding Dies (Machine Cut and Hubbed Cavity Dies)	SAMSON EXTRA Water, Oil Hardening		C .10, Mn .30, Cr 2.30, Si .20	Water, Oil Movement ±B, ±A
Plastic Molding Dies (Machine Cut and Hubbed Cavity Dies)	SUPER SAMSON	(Listed above)		
Plastic Molding Dies (Hubs Cavity Dies, Machine Cut Cavity Dies)	STAINLESS M.S. No. 2		C .30, Cr 13.00	Oil, Air Movement ±B, ±A*
Plastic Molding Dies (Machine Cut Cavity Dies, Hubs)	R.D.S. Oil Hardening	(Listed above)		
Plastic Molding Dies (Machine Cut Cavity Dies, Hubs, Ejector Pins)	VEGA	(Listed above)		
Punching and Shearing		(See HAMPDEN, H-9 Extra, No. 11 Special, No. 484, No. 610, R.D.S., SOLAR, STENTOR, VEGA, listed above)		
Shock Resisting (Repeated, Intermittent Impact)		(See R.D.S., SOLAR, VEGA, listed above)		

*Plus or minus—depending on size and shape of section.

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.

COLONIAL STEEL CO., See Vanadium-Alloys Steel Co. (Listing No. 61)

COLUMBIA TOOL STEEL CO., Lincoln Highway and State St., Chicago Hts., Ill. Listing No. 17

Cold Work Dies (Blanking, Cold Forming)	ATMODIE Air Hardening High Carbon, High Chrome	D2	C 1.50, Mn .30, Cr 12.00, Mo .85, V .85, Si .40	Air Movement A
Cold Work Dies	ATMODIE SMOOTHCUT Air Hardening High Carbon, High Chrome	D2	C 1.50, Mn .30, Cr 12.00, Mo .85, V .85	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	CLARITE High Speed	T1	C .73, Mn .30, Cr 4.00, W 18.00, V 1.10, Si .30	Oil Movement C
Cold Work Dies (Blanking, Cold Forming)	EXLDIE Oil Hardening, Non-Deforming	O1	C .90, Mn 1.15, Cr .50, W .50, V .10, Si .25	Oil Movement B
Cold Work Dies (Blanking, Cold Forming)	EXTRA Water Hardening	W1	C 1.00, Mn .25 Si .25	Water Movement C
Cold Work Dies	EXTRA HEADERDIE Water Hardening	W1	C .95, Mn .35, Si .25	Water Movement A
Cold Work Dies (Blanking, Cold Forming)	EZ-DIE SMOOTHCUT Air Hardening, Non-Deforming	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.15, V .25, Si .30	Air Movement B
Cold Work Dies (Blanking, Cold Forming)	MOLITE High Speed	M3	C .83, Mn .25, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Si .30	Oil Movement C
Cold Work Dies (Blanking, Cold Forming)	OILDIE Oil Hardening, Non-Deforming		C 1.05, Mn .70, Cr 1.60, W .50, Si .40	Oil Movement B
Cold Work Dies (Blanking, Cold Forming)	SPECIAL Water Hardening	W1	C 1.00, Mn .25, Cr .16, V .05, Si .25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	STANDARD Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	SUPERDIE High Carbon, High Chrome	D3	C 2.10, Mn .30, Cr 11.50, W .80, Si .90	Oil Movement A
Cold Work Dies (Blanking, Cold Forming, not severe)	VANADIUM STANDARD Water Hardening	W2	C .90, Mn .25, V .20, Si .25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	WATERDIE EXTRA Water Hardening	W5	C 1.00, Mn .25, Cr .50, Si .25	Water Movement C
Cutting Tools	ACMITE High Tungsten Cobalt High Speed Oil Hardening	T4	C .73, Cr 4.00, W 18.00, V 1.15, Co 5.00	Oil or Salts Movement A
Cutting Tools	MOLITE 3 Moly High Speed Oil Hardening	M3	C 1.03, Cr 4.00, W 6.15, Mo 5.90, V 2.50	Oil or Salts Movement B
Cutting Tools (Finishing)	VANITE High Speed	T2	C .83, Mn .25, Cr 4.25, W 18.50, Mo 1.00 Max, V 2.15, Si .30	Oil Movement C
Cutting Tools (Roughing)	MAXITE Cobalt High Speed	T8	C .73, Mn .25, Cr 4.00, W 14.00, Mo 1.00 Max, V 2.15, Si .30, Co 4.75	Oil Movement C
Cutting Tools (Finishing, Roughing)	(See CLARITE, MOLITE, Listed Above)			
Diecasting Dies	ALCODIE Air Hardening, Heat & Shock Resistant	H12	C .35, Cr 5.00, W 1.25, Mo 1.40, V .40	Air Movement A
Diecasting Dies	CASTDIE Air Hardening, Heat Resistant	H11	C .38, Mn .35, Cr 5.25, Mo 1.35, V .50, Si 1.00	Air Movement A
Diecasting Dies	VANADIUM CASTDIE Air Hardening and Shock Resisting	H13	C .38, Cr 5.25, Mo 1.35, V 1.05	Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear)	BUSTER Oil Hardening, Shock Resistant	S1	C .56, Mn .30, Cr 1.25, W 2.25, V .25, Si .75	Oil Movement B
Hot Work Dies	CLARITE HW Oil Hardening	T1	C .57, Cr 4.00, W 18.00, V .70	Oil or Salts Movement B
Hot Work Dies (Hot Forming, Punch & Shear)	FIREDIE Air Hardening, Heat Resistant	H11	C .35, Mn .35, Cr 5.25, Mo 1.35, V .50, Si 1.00	Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear)	FORMITE #1 High Speed, Heat Resistant		C .35, Mn .25, Cr 4.00, W 13.50, Mo .60 Max, V .35, Si .40	Oil, Air Movement B
Hot Work Dies (Hot Forming, Punch & Shear)	FORMITE #2 High Speed, Heat Resistant	H21	C .30, Mn .30, Cr 3.25, W 9.25, Mo .60 Max, V .50, Si .40	Oil Movement B
Hot Work Dies	FORMITE #3 Oil Hardening	H24	C .50, Cr 3.25, W 15.50, V .50	Oil or Salts Movement B
Hot Work Dies (Hot Forming, Punch & Shear)	MOLITE—HW 10 High Speed, Heat Resistant	M10	C .64, Mn .30, Cr 4.00, Mo 8.25, V 2.00, Si .30	Oil, Air Movement C
Plastic Mold Dies	PLASDIE Oil Hardening	P20	C .30, Cr .50, Mo .25	Oil Movement A
Plastic Mold Dies	(See BUSTER, EXL-DIE, OILDIE Listed Above)			
Punching & Shearing	CEC SMOOTHCUT Oil & Water Hardening	S5	C .55, Mn .50, Si 2.00, Cr .25, V .25	Water, Oil Movement A
Punching & Shearing	(See ATMODIE, SUPERDIE, OILDIE, EXL-DIE, CLARITE, MOLITE, SPECIAL, BUSTER, EXTRA Listed Above)			
Shock Resisting (Repeated Intermittent Impact)	VANADIUM EXTRA Water Hardening		C .95, Mn .25, V .20, Si .25	Water Movement C
Shock Resisting (Repeated Intermittent Impact)	(See BUSTER, SPECIAL, EXTRA, CEC SMOOTHCUT, EXTRA HEADERDIE Listed Above)			

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
CRUCIBLE STEEL CO. OF AMERICA, 405 Lexington Ave., New York 17, N. Y.				**Listing No. 18**
Cold Work Dies (Blanking)	AIRDI 150 Air Hardening		C 1.50, Cr 11.50, Mo .80, V .20	Air Mach. 65 Movement +A
Cold Work Dies (Blanking)	AIRKOOL Air Hardening		C 1.00, Mn .40, Cr 5.25, Mo 1.15, V .40	Air Mach. 75 Movement +A
Cold Work Dies (Blanking)	CHAMPION NON-CHANGEABLE Oil Hardening		C .90, Mn 1.25, Cr .50, W .50	Oil Mach. 80 Movement +A
Cold Work Dies (Blanking)	HYCC Air Hardening		C 2.25, Cr 11.50, Mo .80, V .20	Air, Oil Movement +A
Cold Work Dies (Blanking)	KETOS Oil Hardening		C .90, Mn 1.25, Cr .50, W .50	Oil Mach. 80 Movement +A
Cold Work Dies (Cold Forming)	ALVA EXTRA Water Hardening		C .95, V .20	Water, Brine Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	ATHA PNEU Oil Hardening		C 0.50, Cr 1.25, W 2.75, V .20	Oil Mach. 80 Movement +B
Cold Work Dies (Cold Forming)	CRESCENT SPECIAL Water Hardening		C 1.05	Water, Brine Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	LaBELLE EXTRA Water Hardening		C .95	Water, Brine Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	LaBELLE SILICON #2 Water Hardening		C .60, Mn .75, Cr .25, Mo .30, Si 1.90	Water Mach. 85 Movement +B
Cold Work Dies (Cold Forming)	LaBELLE COLD STRIKING DIE Water Hardening		C .95	Water, Brine Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	SANDERSON EXTRA Water Hardening		C 1.05	Water, Brine Mach. 100 Movement —C
Cold Work Dies (Cold Forming)	AIRKOOL Air Hardening		C 1.00, Mn .40, Cr 5.25, Mo 1.15, V .40	Air Mach. 75 Movement +A
Cold Work Dies, Wear Parts (Blanking, Cold Forming)	HALCOMB FM Graphitic Oil Hardening		C 1.50, Mn .75, Mo .25, Si 1.00	Oil Movement +A
Cold Work Dies, Wear Parts (Blanking, Cold Forming)	HYCV Air Hardening		C 2.45, Cr 12.25, Mo 1.00, V 3.75	Air Movement +A
Cutting Tools (Roughing)	REX AAA High Speed		C .75, Cr 4.00, W 18.00, Mo .75, V 1.15, Co 5.00	Air, Oil or Salt Mach. 65 Movement +A
Cutting Tools (Roughing)	REX M2-5 High Speed		C .83, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Co 5.00	Air, Oil or Salt Movement +A
Cutting Tools (Roughing)	REX 95 High Speed		C .80, Cr 4.00, W 14.00, Mo .75, V 2.00, Co 5.25	Air, Oil or Salt Movement +A
Cutting Tools (Roughing)	REX SUPERCUT High Speed		C .77, Cr 4.00, W 18.50, Mo .65, V 2.00, Co 8.00	Air, Oil or Salt Movement +A
Cutting Tools (Roughing)	REX 440 High Speed		C .80, Cr 4.00, W 19.50, Mo .60, V 2.00, Co 12.00	Air, Oil or Salt Movement +A
Cutting Tools (General Purpose)	REX AA High Speed		C .73, Cr 4.00, W 18.00, V 1.15	Air, Oil or Salt Mach. 70 Movement +A
Cutting Tools (General Purpose)	REX M-2 High Speed		C .83, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Air, Oil or Salt Mach. 70 Movement +A
Cutting Tools (General Purpose)	REX VM High Speed		C .85, Cr 4.00, Mo 8.00, V 1.90	Air, Oil or Salt Movement +A
Cutting Tools (General Purpose)	REX TMO High Speed		C .80, Cr 3.75, W 1.55, Mo 8.70, V 1.15	Air, Oil or Salt Movement +A
Cutting Tools (Finishing)	REX SUPERVAN High Speed		C .85, Cr 4.00, W 18.50, Mo .75, V 2.10	Air, Oil or Salt Mach. 65 Movement +A
Cutting Tools (Finishing)	REX 4V High Speed		C 1.25, Cr 4.00, W 18.50, Mo .75, V 4.00	Air, Oil or Salt Movement +A
Cutting Tools (Finishing)	REX M-3 High Speed		C 1.05, Cr 4.00, W 5.75, Mo 5.00, V 2.50	Air, Oil or Salt Movement +A
Cutting Tools (Finishing)	CRUCIBLE DOUBLE SPECIAL Water Hardening		C 1.30, W 3.50	Water or Brine Movement —C
Cutting Tools	REXALLOY Cast Alloy		C 2.25, Cr 33.00, W 17.00, Co 44.00	
Diecasting (Lead, Manganese, Tin or Zinc Base)	CSM #2 Oil Hardening		C .40, Cr 5.00, Mo 1.35, Si 1.05, Si .50	Oil Mach. 125 Movement +B
Diecasting (Aluminum Base)	NuDIE V Hot Work		C .40, Cr 5.00, Mo 1.35, Si 1.05, V 1.10	Air Mach. 80 Movement +A
Diecasting (Brass)	PEERLESS A Hot Work		C .28, Cr 3.25, W 9.00, V .25	Air, Oil Mach. 75 Movement +A
Diecasting (Brass)	HALCOMB T.M. Hot Work		C .35, Cr 1.50, W 4.00, Mo .40, Co 5.00, Si .50	Air Movement +A
Diecasting Dies (Hubbed Dies)	AIRMOLD DIE CASTING Die Steel Air Hardening		C .08, Cr 5.00, Mo .50	Air, Oil or Liquid Bath
Diecasting Dies (Parts)	REX AA High Speed, Hot Work		C .73, Cr 4.00, W 18.00, V 1.15	Air, Oil or Salt Mach. 70 Movement +A
Diecasting Dies (Parts)	REX M-2 High Speed, Hot Work		C .83, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Air, Oil or Salt Mach. 70 Movement +A
Diecasting Dies (Parts)	NuDIE V Hot Work		C .40, Cr 5.00, Mo 1.35, V 1.10, Si 1.05	Air Mach. 80 Movement +A
Gages (Flat)	CRESCENT TOOL SHEET Water Hardening		C 1.00	Water or Brine Mach. 160 Movement —C
Gages (Snap)	CRESCENT SPECIAL (Listed above) Water Hardening			

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Gages (Flat, Snap, Plug & Thread)	SS TOOL Oil Hardening		C 1.00, Mn .35, Cr 1.20, Mo .30	Oil Movement +A
Gages (Flat, Snap, Plug & Thread)	(See KETOS, AIRKOOL, HYCC, REX AA, REX M-2 and REXALLOY Listed above)			
High Stress Non Wear (Machinery Parts)	CRUCIBLE SELF-TEM Oil Hardening		C .35, Mn .70, Cr .85, W .50, Mo .40, Si .25	Oil Movement +B
Hot Work Dies (Forming, Punching & Shearing)	ATHA PNEU Hot Work		C .50, Cr 1.25, W 2.75, V .20	Oil Mach. 80 Movement +B
Hot Work Dies (Forming, Punching & Shearing)	HALCOMB 218 Hot Work		C .40, Cr 5.00, Mo 1.35, V .35, Si 1.00	Air Mach. 80 Movement +A
Hot Work Dies (Forming, Punching & Shearing)	CHRO MOW Hot Work		C .30, Cr 5.00, W 1.25, Mo 1.30, Si 1.00	Air Mach. 80 Movement +A
Hot Work Dies (Forming, Punching & Shearing)	C.C.S. Hot Work		C .38, Si 1.15, Cr 5.25, W 4.75	Air Movement +A
Hot Work Dies (Forming, Punching & Shearing)	PEERLESS A Hot Work		C .28, Cr 3.25, W 9.00, V .25	Air or Oil Mach. 75 Movement +A
Hot Work Dies (Forming, Punching & Shearing)	PEERLESS LCT #2 Hot Work		C .40, Cr 2.00, W 11.50, V .35	Air or Oil Mach. 75 Movement +A
Hot Work Dies (Forming, Punching & Shearing)	REX AA (PX Temper) Hot Work		C .53, Cr 4.00, W 18.00, V 1.10	Air or Oil Mach. 70 Movement +A
Plastic Molding Dies (Machine Cut Cavity)	CRUSCA 12B Oil Hardening		C .10, Mn .50, Cr 1.60, Ni 3.50	Oil Movement +B
Plastic Molding Dies (Machine Cut Cavity)	C.V.M. Oil Hardening		C .45, Mn .70, Cr 1.00, V .20	Oil Mach. 85 Movement +B
Plastic Molding Dies (Machine Cut Cavity)	PLASTIC CSM #2 Oil Hardening		C .30, Mn .75, Cr .80, Mo .25, Si .50	Oil Mach. 125 Movement +A
Plastic Molding Dies (Machine Cut Cavity)	(See AIRKOOL, CHAMPION NON-CHANGEABLE, KETOS, NuDIE V, listed above)			
Plastic Molding Dies (Hubbed Cavities)	CRUSCA COLD HUBBING Water Hardening		C .05, Mn .15	Oil, Water Movement —C
Plastic Molding Dies (Hubbed Cavities)	FORMOLD Oil Hardening		C .07, Mn .40, Cr 1.35, Mo .20, Ni .55	Oil Movement +A
Plastic Molding Dies (Hubs)	(See AIRDI 150, AIRKOOL, ATHA PNEU, KETOS, LaBELLE Silicon #2, listed above)			
Plastic Molding Dies (Ejector Pins)	(See NuDIE V, KETOS, listed above)			
Plastic Molding Dies (Ejector Pins)	VICTOR DRILL ROD Water or Oil Hardening		C 1.00	Water or Oil Mach. 100 Movement —C
Punching and Shearing	(See AIRDI 150, AIRKOOL, ALVA EXTRA, ATHA PNEU, CHAMPION-NON-CHANGEABLE, HALVAN, KETOS, REX AA, REX M-2, LaBELLE SILICON #2, listed above)			
Shock Resisting (Intermittent Impact)	ALVA EXTRA		C .95, V .20	Water, Brine Mach. 100 Movement —C
Shock Resisting (Intermittent Impact)	BLACK DIAMOND		C .95	Water, Brine Mach. 100 Movement —C
Shock Resisting (Repeated Impact)	HALVAN Oil Hardening		C .45, Mn .70, Cr 1.00, V .20	Oil Mach. 85 Movement +B
Shock Resisting (Repeated Impact)	(See ATHA PNEU, LaBELLE SILICON #2, listed above)			

DARWIN & MILNER INC., 2345 St. Clair Ave., Cleveland 14, O. — Listing No. 19

Cold Forming	DARWIN BRAKE DIE Oil Hardening		C .50, Mn 1.00, Cr .85, Mo .15	Oil Mach. 60
Cold Work Dies	CV Water Hardening	W2	C .95, V .20	Water Mach. 100 Movement B
Cold Work Dies	DARWIN #1 Air Hardening	D2	C 1.50, Mn .35, Cr 13.00, Mo .75, V .25, Si .40, Ni .40	Air Mach. 50 Movement A
Cold Work Dies	DARWIN FLAME HRD Air Hardening		C .50, Mn 1.20, Cr 1.40, Mo .40, V .10, Si .50	Air Mach. 75 Movement B
Cold Work Dies	H BRAND Oil Hardening	O2	C .90, Mn 1.50, Mo .30, Si .25	Oil Mach. 90 Movement A
Cold Work Dies	MINEOR Air Hardening	A2	C 1.00, Mn .60, Cr 5.00, Mo 1.00, V .25, Si .40	Air Mach. 65 Movement B
Cold Work Dies	OHT Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, Si .35	Oil Mach. 85 Movement A
Cold Work Dies	TEMPER TOUGH Oil Hardening	L6	C .75, Mn .60, Cr .80, Mo .30, V .15, Si 1.15	Oil Mach. 75 Movement B
Cold Work Dies (Blanking, Cold Forming)	NEOR Oil Hardening	D3	C 2.10, Mn .60, Cr 13.00, Si .40, Ni .50	Oil Mach. 40 Movement A
Cold Work Dies (Blanking, Cold Forming)	PRK-33 Air Hardening	D5	C 1.40, Mn .30, Cr 13.00, Mo .60, Co 3.30, Si .60, Ni .50	Air Mach. 50 Movement A
Cutting Tools	CANNON Oil, Air Hardening	T1	C .70, Mn .25, Cr 4.00, W 18.00, V 1.00, Si .35	Oil, Air Mach. 50 Movement B
Cutting Tools	CANNON SPECIAL Oil, Air Hardening	T2	C .80, Mn .25, Cr 4.00, W 18.00, Mo .60, V 2.00, Si .30	Oil, Air Mach. 50 Movement B
Cutting Tools	DARWIN 505 Oil, Air Hardening	T4	C .70, Mn .30, Cr 4.00, W 18.00, Mo .60, V 1.15, Co 5.00, Si .25	Oil, Air Mach. 50 Movement B
Cutting Tools	DARWIN 505 SPECIAL Oil, Air Hardening	T5	C .80, Mn .30, Cr 4.00, W 18.00, Mo .80, V 2.00, Co 8.00, Si .25	Oil Mach. 45 Movement B
Cutting Tools	DARWIN 1366 Oil Hardening	T6	C .80, Mn .30, Cr 4.00, W 18.00, Mo .80, V 2.00, Co 13.00, Si .25	Oil Mach. 45 Movement B
Cutting Tools	DARWIN M-3 Oil Hardening	M3	C 1.10, Cr 4.00, W 5.75, Mo 5.00, V 2.50	Oil Mach. 55 Movement B
Cutting Tools	MT-6 Oil Hardening	M2	C .85, Mn .25, Cr 4.00, W 6.00, Mo 6.00, V 1.50, Si .25	Oil Mach. 55 Movement B
Fast Finishing	EE Water, Oil Hardening	W4	C 1.50, Mn .30, Cr .20, W 4.50, V .35, Si .30	Oil, Water Mach. 65 Movement B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work	DARWIN 93 — Oil Hardening	H21	C .30, Cr 3.00, W 9.00, V .45	Oil Mach. 60 Movement A
Hot Work	FIREX SPECIAL — Air Hardening	S10A	C .50, Mn .65, Cr .85, Mo .60, V .20, Si .30, Ni 4.00	Air Mach. 40 Movement A
Hot Work	IWI — Oil Hardening	H24	C .45, Mn .25, Cr 4.00, W 15.00, V .70, Si .30	Oil Mach. 50 Movement B
Hot Work Dies	HWA — Air Hardening	H13	C .35, Cr 5.00, Mo 1.00, V 1.00, Si 1.00	Air Mach. 70 Movement B
Hot Work Dies	HWS — Oil, Air Hardening	H12	C .33, Cr 5.00, W 1.25, Mo 1.45, V 23, Si .85	Air, Oil Mach. 70 Movement B
Plastic Molding	HOBALITE — Water Hardening		C .05, Mn .15, Si .01	Water Mach. 110 Movement B
Punches & Dies	SSC — Water Hardening	W1	C 1.00, Mn .30, Si .50	Water Mach. 100 Movement C
Shock Resisting	XTRA TOUGH — Water, Oil Hardening	S5	C .58, Mn .70, Mo .40, V .25, Si 1.85	Oil, Water Mach. 100 Movement B
Shock Resisting	W BRAND — Oil Hardening	S3	C .45, Mn .35, Cr .80, W .85, Si .30	Oil Mach. 85 Movement B
Shock Steel	IDEOR — Oil Hardening	S1	C .50, Mn .25, Cr 1.50, W 2.00, V .25, Si .30	Oil Mach. 85 Movement B

DELAWARE TOOL STEEL CORP., 3300 Market St., Wilmington 99, Del. — Listing No. 20

Shock Resisting	DELAIR	A2	C, Mn, Si, Cr, Mo	Air Mach. 90 Movement A
Shock Resisting	DELAWARE Extra	W1	C, Mn, Si, Va	Water Mach. 100 Movement C
Shock Resisting	DELAWARE H.S.	M2	C, Mn, Si, Cr, W, Mo, Va	Air Mach. 60 Movement A
Shock Resisting	DELAWARE S.T.		C, Mn, Si, Mo, Va	Water Mach. 100 Movement B
Shock Resisting	DELAWARE STANDARD	W1	C, Mn, Si	Water Mach. 100 Movement C
Shock Resisting	DELAWARE SUPERIOR		C, Mn, Si, Cr, W, Mo, Va, Co	Air Mach. 60 Movement A
Shock Resisting	DELSTEEL Alloy	S5	C, Mn, Si, Mo, Va	Oil, Water Mach. 80 Movement B

DIEHL STEEL CO., 236 Broadway, Cincinnati 2, O. — Listing No. 21

Cold Work (Blanking-Forming Punches, Etc.)	KROVAN — Air Hardening	A2	C 1.0, Mn .7, Si .3, Cr 5.2, Mo 1.1, V .2	Air
Cold Work Dies (Blanking, Cold Forming)	GRADE "A" — Water Hardening	W1, GR1	C .95, Mn .30, Si .20	Water Movement A
Cold Work Dies (Blanking, Cold Forming)	UTEX — Oil Hardening	O1	C .95, Mn 1.00, Cr .50, W .60, V .25, Si .25	Oil
Cold Work Dies (Cold Forming)	HICRO — Oil Hardening	D2, D3	C 1.55, Mn .25, Cr 12.00, Mo .80, V .35, Si .35	Oil, Air
Cold Work Dies (Punches, Small Tools)	VERI BEST DRILL ROD — Oil Hardening	O1	C .95, Mn 1.05, Cr .55, W .65, V .15, Si .35	Oil
Cutting Tools	BLUE STREAK MOLY — Oil Hardening, High Speed	M2	C .80, Cr 4.00, W 5.75, Mo 4.50, V 1.60	Oil
Cutting Tools	BLUE STREAK 18-4-1 — Oil Hardening	T1	C .72, Cr 4.00, W 18.00, V 1.00	Oil
Hot Work Dies	A. M. D. — Air Hardening		C .34, Mn .40, Cr 4.75, W 1.10, Mo 1.45	Air
Punching, Shearing	(See Grade "A", UTEX, Listed Above)			
Ring Cold Work Dies	HOLLOBAR — Oil Hardening	O1	C 1.05, Mn .33, Cr 1.46, Si .28	Oil

HENRY DISSTON DIVISION, H. K. Porter Co. Inc., Unruh & Milnor Sts., Philadelphia 35, Pa. — Listing No. 21A

Cold Work Dies	NICROMAN — Oil Hardening	L6	C .70, Mn .45, Cr 1.00, Si .20, Ni 1.65	Oil Mach. 80 Movement A
Cold Work Dies (Blanking, Cold Forming)	BEST CARBON — Water Hardening	W1	C as ord., Mn .20, Si .20	Water Mach. 100 Movement B
Cold Work Dies (Blanking, Cold Forming)	CRAIRMO — Air Hardening	A2	C 1.00, Mn .50, Si .30, Cr 5.00, V .30, Mo 1.00	Air Mach. 80 Movement A
Cold Work Dies (Blanking, Cold Forming)	CROLOY — Oil Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .80, V .95, Si .30	Oil Mach. 60 Movement A
Cold Work Dies (Blanking, Cold Forming)	D-9-Mo — Water Hardening		C 1.15, Mn .60, Mo .20, Si .50	Water Mach. 95 Movement A
Cold Work Dies (Blanking, Cold Forming)	D-9-Va — Water, Oil Hardening	W3	C 1.15, Mn .60, V .20, Si .60	Oil, Water Mach. 95 Movement A
Cold Work Dies (Blanking, Cold Forming)	MANSIL — Oil Hardening	O1	C .90, Mn 1.15, Cr .50, W .50, Si .35	Oil Mach. 85 Movement A
Cold Work Dies (Blanking, Cold Forming)	VA-TOOL — Water Hardening	W2	C .95, Mn .25, Cr .15, V .25, Si .20	Water Mach. 95 Movement A
Cutting Tools	(See D-9-Mo, D-9-Va, Listed Above)			

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Finishing)	D-6-CO Oil Hardening	T4	C .75, Mn .25, Cr 4.00, W 18.25, Mo .65, V 2.00, Co 5.75, Si .20	Oil Mach. 55 Movement B
Cutting Tools (Finishing)	No. 844 Oil Hardening	L1	C .85, Mn .30, Cr .90, Si .25	Oil Mach. 80 Movement B
Cutting Tools (Finishing, Grass, Leather, etc.)	No. 871 Oil Hardening		C .55, Mn .65, Mo .20, Si .20	Oil Mach. 90 Movement B
Cutting Tools (Finishing, Wood, Plastic)	POLARIS Oil Hardening		C .85, Mn .30, Cr .15, Si .25, Ni .70	Oil Mach. 100 Movement A
Cutting Tools (Finishing)	TUNGSTEN HACK Oil Hardening		C .90, Mn .20, W 1.00, V .15, Si .15	Oil Mach. 85 Movement B
Cutting Tools (Roughing, Finishing)	KUTKWIK Oil Hardening	T1	C .75, Mn .25, Cr 4.00, W 18.25, Mo .80, V 1.10, Si .25	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	6N6-M2 Oil Hardening	M2	C .82, Mn .25, Cr 4.25, W 6.35, Mo 5.00, V 1.90, Si .35	Oil Mach. 65 Movement A
Diecasting Dies	No. 872 Oil Hardening	H21	C .35, Mn .30, Cr 3.25, W 9.25, V .30, Si .35	Oil Mach. 80 Movement A
Hot Work Dies (Punching, Shearing, Forming)	No. 873 Oil Hardening	H12	C .35, Mn .35, Cr 5.00, W 1.35, Mo 1.35, V .40, Si 1.00	Oil Mach. 85 Movement A
Hot Work Dies (Punching, Shearing, Forming)	No. 877 Oil Hardening	H13	C .35, Mn .30, Si .30, Cr 5.00, V 1.00, Mo 1.50	Oil Mach. 85 Movement A
Hot Work Dies (Forming)	KEYSTONE Oil Hardening	S1	C .50, Mn .30, Cr 1.10, W 2.00, V .20, Si .20	Oil Mach. 85 Movement B
Hot Work Dies (Forming)	No. 872 (Listed Above)			
Plastic Molding Dies (Hubs)	CROLOY (Listed Above)			
Plastic Molding Dies (Hubbed Cavity Dies)	PLASTALLOY Water Hardening	P2	C .10 Max., Mn .45, Cr .50, Si .20, Max., Ni 1.20	Water Mach. 95 Movement B
Plastic Molding Dies (Hubbed Cavity Dies)	PLASTIRON Water Hardening	P1	C .10 Max., Mn .15, Si .20 Max.	Water Mach. 95 Movement B
Punching, Shearing	EXTRA CARBON Water Hardening	W1	C 1.00, Mn .20, Si .20	Water Mach. 100 Movement B
Punching, Shearing	STANDARD Water Hardening	W1	C 1.00, Mn .20, Si .20	Water Mach. 100 Movement B
Punching, Shearing	812 DIE Oil Hardening	D3	C 1.80, Mn .30, Cr 12.25, Si .25	Oil Mach. 50 Movement A
Punching, Shearing	(See BEST CARBON, CROLOY, MANSIL, NICROMAN, Listed Above)			
Shock Resisting (Repeated Impact)	D29 Oil Hardening	S5	C .55, Mn .90, Mo .40, Si 1.35	Oil Mach. 80 Movement B
Shock Resisting (Repeated Impact)	KEYSTONE (Listed Above)			

DoALL CO., 254 No. Laurel Ave., Des Plaines, Ill. — Listing No. 22

Cold Work Dies	OIL HARDENING	O1	C .90, Mn 1.20, Cr .50, W .50, Si .20, V .20	Oil Mach. 100 Movement A
Cold Work Dies (Lamination Dies, etc.)	AIR HARDENING	A2	C 1.00, Mn .50, Cr 5.00, Mo 1.25, V .30, Si .25	Air Mach. 85 Movement B
Cutting Tools (Chip Removal, Cast Iron and Nonferrous, Roughing)	DO-1, Carbide			
Cutting Tools (Chip Removal, Cast Iron and Nonferrous, General Purpose)	DO-2, Carbide			
Cutting Tools (Chip Removal, Cast Iron and Nonferrous, Precision Boring, Light Finishing)	DO-3, Carbide			
Cutting Tools (Chip Removal, Steel, Roughing)	DO-5, Carbide			
Cutting Tools (Chip Removal, Steel, General Purpose)	DO-6, Carbide			
Cutting Tools (Chip Removal, Steel, Finishing)	DO-7, Carbide			
Cutting Tools (Chip Removal, Steel, Precision Boring)	DO-8, Carbide			
Wear Surface (No Shock)	DO-2, Carbide			
Wear Surface (Light Shock)	DO-10, Carbide			
Wear Surface (Heavy Shock)	DO-11, Carbide			
Impact (Light)	DO-10, Carbide			
Impact (Medium)	DO-13, Carbide			
Impact (Heavy)	DO-14, Carbide			

FAITOUTE IRON & STEEL CO. INC., 182 Frelinghuysen Ave., Newark 5, N. J. — Listing No. 23

Cold Work Dies	FISCO CARBON Water Hardening	W1	C 1.05, Mn .25, Si .24	Water Mach. 100 Movement C
Cold Work Dies	FISCO CHROMDIE Oil, Air Hardening	D2	C 1.60, Mn .28, Cr 12.00, Mo .85, V .23, Si .38	Air Mach. 45 Movement A
Cold Work Dies	FISCO OILHARD Oil Hardening	O1	C .90, Mn 1.15, Cr .50, W .50, V .20, Si .20	Oil Mach. 90 Movement A
Cold Work Dies	FISCO SPECIAL Water Hardening	W1	C 1.05, Mn .25, Si .24	Water Mach. 100 Movement C
Cutting Tools	FISCO HIGH SPEED High Speed	T1	C .72, Mn .28, Cr 4.00, W 18.00, V 1.00, Si .22	Oil Mach. 60 Movement B
Cutting Tools	(See FISCO CARBON, FISCO SPECIAL, Listed Above)			
Shock Resisting (Intermittent Impact)	FISCO DUPLEX Water Hardening	W1	C .85, Mn .25, Si .25	Water Mach. 100 Movement C
Shock Resisting (Repeated Impact)	FISCO OMEGA Water, Oil Hardening	S5	C .60, Mn .80, Mo .50, V .25, Si 1.85	Oil Mach. 65 Movement B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.

A. FINKL & SONS CO., 2011 Southport Ave., Chicago 14, Ill. — Listing No. 24

Hot Work Dies (Hot Forgings)	F Water Hardening		C, Mn	Water Movement B
Hot Work Dies (Hot Forming)	CUPRODIE		Cr, Mo, Cu, Ni	Hardened
Hot Work Dies (Hot Forming)	DURODI Oil, Air Hardening		Cr, Mo, Si, Ni	Oil, Air Blast Movement A
Hot Work Dies (Hot Forming)	FS		Cr, Mo, Ni	Oil Movement —A
Hot Work Dies (Hot Forming)	FX		Cr, Mo, Ni	Hardened
Hot Work Dies (Hot Forming)	SHELLDIE Oil, Air Hardening		Cr, Mo, Si	Oil, Air Blast Movement A
Punching, Shearing (Cold, Hot Trimming)	COLD HOT Water, Oil Hardening		Cr, Mo	Oil, Water Movement A

FIRTH-LOACH METALS INC., Buttermilk Hollow Rd., P. O. Box 486, McKeesport, Pa. — Listing No. 25

Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, Heavy Roughing or Interrupted Cutting) ..... FA-3, Carbide

Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, Heavy Roughing or Light, Interrupted Cutting) ..... FA-4, Carbide

Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, General Machining and Wear-Resistant Applications) ..... FA-5, Carbide

Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, General Purpose Machining) ..... FA-6, Carbide

Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, Finishing) ..... FA-7, Carbide

Cutting Tools (Cast Iron, Nonferrous and Nonmetallics, Fine Finishing) ..... FA-8, Carbide

Cutting Tools (Steel and Steel Alloys, Heavy Roughing or Interrupted Cutting) ..... FT-3, Carbide

Cutting Tools (Steel and Steel Alloys, General Machine Shop Work) ..... FT-4, Carbide

Cutting Tools (Steel and Steel Alloys, Boring and Forming Locomotive Car Wheels) ..... FT-5, Carbide

Cutting Tools (Steel and Steel Alloys, Fine Finishing) .... FT-6, Carbide

Cutting Tools (Steel and Steel Alloys, Precision Boring, Light Finishing) ..... FT-7, Carbide

Blanking Dies and Punches (Heavy Punches and Die Sections, Heavy Shock) ..... FB-3, Carbide

Blanking Dies and Punches (General Work) ..... FB-4, Carbide

Blanking Dies and Punches (Slitter Knives, Wear Parts, Punches for Thicker Metals) ..... FB-5, Carbide

Blanking Dies and Punches (Small Rolls, Wear Parts, Punches for Blanking Thin, Ductile Materials) ..... FB-6, Carbide

Draw Dies (For Drawing Wire, Tube and Bar Stock) ..... FD-3, Carbide

Draw Dies (For Drawing Wire, Tube and Bar Stock) ..... FD-4, Carbide

Draw Dies (For Drawing Wire, Tube and Bar Stock) ..... FD-5, Carbide

Heading Dies and Punches ..... FH-3, Carbide

Heading Dies and Punches ..... FH-4, Carbide

Heading Dies and Punches ..... FH-5, Carbide

Heading Dies and Punches ..... FH-6, Carbide

Mining Tools (Rock Bits) ..... FM-3, Carbide

Mining Tools (Coal Mining) ..... FM-4, Carbide

Mining Tools (Auger Bits) ..... FM-5, Carbide

Mining Tools (Auger Bits) ..... FM-6, Carbide

FIRTH STERLING INC., 3113 Forbes St., Pittsburgh 30, Pa. — Listing No. 26

Boring Tool (Hardest Material)	FIRTHITE HF, Carbide		WC 97, Co 3	
Boring Tool (High Speed)	FIRTHITE T31, Carbide		WC 67, Co 8, Ti 25	
Cold Work Dies	AIRVAN Air Hardening	A2	C 1.00, Cr 5.25, Mo 1.15, V .30	Air, Oil Mach. 70 Movement A
Cold Work Dies	A.W. SPECIAL Water, Oil Hardening	L3	C 1.00, Cr 1.45, V .20	Water, Oil Mach. 85 Movement A
Cold Work Dies	C.E.S. Air, Oil Hardening		C .60, Mn .50, Si .30, Cr 1.15, Mo .25, Ni 3.25	Air, Oil Mach. 50 Movement A
Cold Work Dies	CROMOVAN DIE Air Hardening	D2	C 1.55, Cr 12.00, Mo 1.00, V 1.00	Air, Oil Mach. 45 Movement A
Cold Work Dies	C.H.Q. Water Hardening	W1	C .95	Brine, Water Mach. 100 Movement C
Cold Work Dies	INVARO #1 Oil Hardening	O1	C .90, Mn 1.15, Cr .50, W .50, V .20	Oil Mach. 90 Movement A
Cold Work Dies	INVARO #2 Oil Hardening	O2	C .90, Si .25, Mn 1.65, Mo .35, V .15	Oil Mach. 90 Movement A
Cold Work Dies	METEOR Water, Oil Hardening	F1	C 1.22, Mn .30, Cr .35, W 1.45, V .15	Water, Oil Mach. 85 Movement A
Cold Work Dies	NITRARD No. 1 Air Hardening	D2	C 1.55, Cr 12.00, Mo 1.00, V 1.00	Oil, Air Mach. 45 Movement A
Cold Work Dies	SILVER DIE No. 1 Water Hardening	W1	C .92	Brine, Water Mach. 100 Movement C
Cold Work Dies	SILVER DIE No. 2 Water Hardening	W1	C .95, Mn .40, Si .35	Brine, Water Mach. 100 Movement C
Cold Work Dies	STAR BLUE CHIP High Speed	T7	C .73, Cr 4.75, W 14.00, V 1.65	Oil, Air Mach. 55 Movement A
Cold Work Dies	TRIPLE DIE Oil Hardening	D3	C 2.20, Cr 12.00, V .25	Oil, Air Mach. 40 Movement A
Cold Work Dies, Tools	DIAMOND M Water Hardening	W1	C 1.30, Cr .25	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. BEST Water Hardening	W1	C As Spec.	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. EXTRA Water Hardening	W1	C As Spec.	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	F.S. SPECIAL Water Hardening	W1	C As Spec.	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	GLOBE DRILL ROD Water Hardening	W1	C 1.25	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SILVAN STAR Water Hardening	W2	C 1.00, V .20	Brine, Water Mach. 100 Movement C

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
Cold Work Dies, Tools	SILVER STAR Water Hardening	W1	C 1.00	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	SPECIAL A.S.V. Water Hardening	W1	C 1.00	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING Water Hardening	W1	C 1.00	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STERLING V Water Hardening	W2	C 1.00, V .20	Brine, Water Mach. 100 Movement C
Cold Work Dies, Tools	STER M Water Hardening	W4	C 1.25, Cr .25	Brine, Water Mach. 100 Movement C
Cutting Tools (Light Interrupted Cuts, Slow Speeds, Cast Iron and Nonferrous Materials)	FIRTHITE H, Carbide		WC 94, Co 6	
Cutting Tools (General Purpose Work, Cast Iron and Nonferrous Materials)	FIRTHITE HA, Carbide		WC 90.5, Co 6.5, Tic 3	
Cutting Tools (Rough Intermittent Cuts, Coarse Feeds, Cast Iron and Nonferrous Materials)	FIRTHITE HB, Carbide		WC 92, Co 8	
Cutting Tools (Strongest WC Grade, Skiving, Cast Iron and Nonferrous Materials)	FIRTHITE HC, Carbide		WC 87, Co 13	
Cutting Tools (Light Cuts, Fine Feeds, Cast Iron and Nonferrous materials)	FIRTHITE HE, Carbide		WC 96, Co 4	
Cutting Tools (Rough Intermittent Cuts, Steel)	FIRTHITE T04, Carbide		WC 86, Co 10, Tic 4	
Cutting Tools (Heavy Duty, Steel)	FIRTHITE TXH, Carbide		WC 83, Co 8.0, Tic 9	
Cutting Tools (Light Steady Cuts, Fine Feeds, Steel)	FIRTHITE T16, Carbide		WC 76, Co 8, Tic 16	
Cutting Tools (Precision Boring, Steel)	FIRTHITE T31, Carbide		WC 68.5, Co 6.5, Tic 25	
Cutting Tools (Medium Feeds, More Crater Resisting than TA, Steel)	FIRTHITE T89, Carbide		WC 73, Co 10, Ti 12, Ta 5	
Cutting Tools	BLUE CHIP High Speed	T1	C .73, Cr 4.00, W 18.00, V 1.10	Oil, Air Mach. 55 Movement A
Cutting Tools	CIRCLE C High Speed	T5	C .77, Cr 4.50, W 18.50, Mo 1.00, V 2.00, Co 9.00	Oil, Air Mach. 40 Movement A
Cutting Tools	CIRCLE M High Speed	M36	C .85, W 6.00, Cr 4.00, Mo 5.00, Co 9.00, V 2.00	Oil, Air Mach. 45 Movement A
Cutting Tools	RED CHIP High Speed	T4	C .75, Cr 4.00, W 18.00, Mo .75, V 1.10, Co 5.00	Oil, Air Mach. 50 Movement A
Cutting Tools	FS2-5 High Speed	T8	C .80, Cr 4.00, W 14.00, Mo .75, V 2.00, Co 5.00	Oil, Air Mach. 45 Movement A
Cutting Tools	FS M-2½ High Speed	M3	C 1.00, W 6.00, Cr 4.10, V 2.40, Mo 5.75	Air, Oil Mach. 50 Movement A
Cutting Tools	FS M-10 High Speed	M10	C .85, Cr 4.25, V 2.00, Mo 8.25	Oil, Air Mach. 60 Movement A
Cutting Tools	HI-MO High Speed	M1	C .80, Cr 4.00, W 1.60, Mo 8.70, V 1.25	Oil, Air Mach. 60 Movement A
Cutting Tools	H.V. BLUE CHIP High Speed	T2	C .83, Cr 4.00, W 18.50, Mo .75, V 2.00	Oil, Air Mach. 45 Movement A
Cutting Tools	MO CHIP High Speed	M20	C .50, Cr 5.00, Mo 8.00, V 1.25, Co 2.50, B .25	Oil, Air Mach. 55 Movement A
Cutting Tools	R.T. STEEL Water Hardening	F2	C 1.30, Cr .25, W 3.50	Brine, Water Mach. 60 Movement C
Cutting Tools	STAR-MO M2 High Speed	M2	C .83, Cr 4.00, W 6.40, Mo 5.00, V 2.00	Oil, Air Mach. 55 Movement A
Cutting Tools	SUPER HI-MO High Speed	M30	C .80 Cr 4.00, W 1.80, Mo 8.50, V 1.25, Co 5.00	Oil, Air Mach. 55 Movement A
Cutting Tools	SUPER MO CHIP High Speed	M40	C .59, Cr 4.20, W 1.65, Mo 8.15, V 1.80, Co 8.20, B .50	Oil, Air Mach. 40 Movement A
Cutting Tools	VAN CHIP	M3	C 1.15, Cr 4.10, W 6.00, Mo 5.75, V 3.00	Oil, Air Mach. 55 Movement A
Diecasting Dies	B.D.C. Oil, Air Hardening	H23	C .33, Mn .35, Cr 12.00, W 12.00, V 1.05, Si .35	Oil, Air Mach. 50 Movement A
Diecasting Dies	L.T. FORGING DIE Oil, Air Hardening	H21	C .30, Cr 3.50, W 9.50, V .50	Air, Oil Mach. 60 Movement A
Drawing Dies	R.T. STEEL (Listed Above)			
General Purpose	FIRTHITE HA, Carbide (Listed Above)			
General Purpose	FIRTHITE TA, Carbide		WC 84, Co 6.5, Ti 9.5	
Hot Work Dies	C.Y.W. Oil, Air Hardening		C .95, Mn .50, Cr 3.60	Air, Oil Mach. 80 Movement A
Hot Work Dies	H.W.D. #1 Air Hardening	H12	C .35, W 1.40, Cr 5.00, V .30, Mo 1.55, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. #2 Air Hardening	H11	C .37, Cr 5.25, V .50, Mo 1.35, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. #3 Air Hardening	H13	C .40, Cr 5.25, V 1.00, Mo 1.25, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	H.W.D. (Mod.)	H12 (mod.)	C .55, W 1.40, Cr 5.00, V .30, Mo 1.55, Si 1.00	Air, Oil Mach. 75 Movement A
Hot Work Dies	L.T.L. Grade Air, Oil Hardening	H21	C .25, W 10.0, Cr 2.75, Ni 1.50, V .25	Air, Oil Mach. 60 Movement A
Hot Work Dies	XDH Oil, Air Hardening	H26	C .55, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 60 Movement A
Hot Work Dies	XDL Oil, Air Hardening	H25	C .38, Cr 3.50, W 14.00, V .50	Oil, Air Mach. 60 Movement A
Hot Work Dies	XDM Oil, Air Hardening	H26	C .50, Cr 3.50, W 18.00, V .95	Oil, Air Mach. 65 Movement A
Hot Work Dies	(See B.D.C., H.W.D., L.T. FORGING DIE, Listed Above)			

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Punching and Shearing	CHIMO PUNCH Water, Oil Hardening	S5	C .55, Mn .95, Cr .15, Mo .50, V .20, Si 2.00	Water, Oil Mach. 85 Movement B
Punching and Shearing	DEMMLER D Water, Oil Hardening	L2	C .52, Mn .85, Cr 1.00, V .20	Water, Oil Mach. 75 Movement C
Punching and Shearing	J.S. PUNCH Oil Hardening	S1	C .50, Cr 1.40, W 2.50, V .25	Oil Mach. 80 Movement A
Shock Resisting	(See CHIMO PUNCH, DEMMLER D, J.S. PUNCH, C.E.S. Listed Above)			
Shock Resisting (Bolt Heading)	FIRTHITE ND20, Carbide		WC 75, Co 20, Ta 5	
Shock Resisting (Punches, Cold Heading)	FIRTHITE ND25, Carbide		WC 70, Co 25, Ta 5	
Wear Parts (Guides, Gage Blocks)	FIRTHITE T41H, Carbide		WC 82, Co 8, Ta 10	
Wear Parts (Gage Components, Balls)	FIRTHITE CR-1, Chromium Carbide		Chromium Carbides 89, Ni 11	
Wear Parts (Valve Trim, Hot Extrusion)	FIRTHITE CR-2, Chromium Carbide		Chromium Carbides 84, Ni 16	
Wear Parts (Nozzles, Erosion Resistance)	FIRTHITE CR-3, Chromium Carbide		Chromium Carbides 70, Ni 15, Tic 15	

GREAT WESTERN STEEL CO. INC., Division of Hoyland Steel Co. Inc., 1011 E. 61st St., Los Angeles 1, Calif. — Listing No. 27

Cold Work Dies	GW COLD HEADER DIE STEEL Water Hardening	W1	(Secure special information from manufacturer)	
Cold Work Dies	GW-CVM Air Hardening	A2	C .95-1.05, Mn .60-.80, Cr 5.00-5.50, Mo .95-1.25, V .20-.30, Si .20-.40	Air
Cold Work Dies	GW-CW-OIL Oil Hardening	O1	C .85-.95, Mn 1.00-1.20, Cr .40-.60, W .40-.60, Si .25-.45	Oil
Cold Work Dies	GW-EXTRA Water Hardening	W1	C 1.00-1.10, Mn .25-.35, Si .25-.35	Water
Cold Work Dies	GW-SPECIAL Water Hardening	W1	C 1.00-1.20, Mn .25-.35, Si .20-.30	Water
Cold Work Dies	GW-350-FAST FINISHING Water Hardening		C 1.25-1.35, Mn .20-.40, W 3.00-4.00, Si .45	Water
Cold Work Dies (Stamping and Forming)	GW-L97		C .55, Cr 1.00, Ni 3.00, Mo .35	Air, Oil
Cold Work Dies (Blanking)	GW-265-HIGH PRODUCTION Oil, Air Hardening	D2	C 1.55-1.70, Mn .25-.35, Cr 11.50-12.50, Mo .70-.90, V .15-.25, Si .25-.35	Air, Oil
Cold Work Dies (Blanking)	GW-265-H-HIGH PRODUCTION	D3	C 2.05, Mn .40, Cr 11.50, V .60	Air, Oil
Cold Work Tools	GW-REGULAR Water Hardening	W1	C as specified, Mn .20-.35, Si .25-.35	Water
Cutting Tools (Roughing)	GW SILVER STRIPE Oil, Air Hardening	T1	C .70-75, Mn .10-.30, Cr 3.75-4.25, W 17.50-18.50, V .95-1.15, Si .25-.40	Oil, Air
Cutting Tools (Roughing)	GW SUPER-KUT Oil, Air Hardening	T4	C .68-.75, Mn .10-.30, Cr 3.75-4.25, W 16.75-17.75, Mo .40-.60, V .95-1.15, Co 4.25-4.75, Si .25-.40	Oil, Air
Cutting Tools (Roughing)	GW 6-6-2 Oil, Air Hardening	M2	C .75-.85, Mn .20-.30, Cr 3.90-4.30, W 5.50-6.00, Mo 4.50-5.50, V 1.40-1.75, Si .20-.40	Oil, Air
Cutting Tools (Finishing)	(See GW-SPECIAL, GW-EXTRA, GW-350, Listed Above)			
Hot Work Dies	GW-99-HOT WORK Air Hardening	H12	C .30-.35, Mn .30-.40, Cr 4.50-5.00, W 1.00-1.20, Mo 1.40-1.60, Si .80-1.00	Air
Hot Work Dies	GW-99-VAN-HOT WORK Air Hardening	H13	C .40, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air
Hot Work Dies	GW-310-HOT WORK Oil, Air Hardening	H21	C .28-.33, Mn .20-.30, Cr 3.00-3.50, W 9.50-10.50, V .25-.50, Si .20-.40	Oil, Air
Hot Work Dies	GW-313-HOT WORK Oil, Air Hardening	H26	C .35-.40, Mn .20-.35, Cr 2.75-3.25, W 13.00-14.00, Si .20-.40	Oil, Air
Hot Work Dies	GW-515-HOT WORK Air Hardening		C .35-.40, Mn .20-.35, Cr 4.80-5.30, W 4.80-5.30, Mo .15-.30, Si .80-1.10	Air
Plastic Molding Dies	GW REMA IRON		C .05-.07, Mn .15-.20	
Plastic Molding Dies	GW REMA B		C .07, Mn .30, Si .15, Cr 1.00, Mo .25	Oil
Shock Resisting (Repeated Impact)	GW-280-TUFKUT Water Hardening	S5	C .50-.55, Mn .60-.80, Mo .30-.40, Si 1.30-1.60	Water
Shock Resisting (Repeated Impact)	GW-422-MIRYCAL Water, Oil Hardening	S1	C .45-.50, Mn .20-.50, Cr .85-1.05, W .90-1.20, Mo .15-.25, Si .15-.30	Water, Oil

HAWKRIDGE BROS. CO., 303 Congress St., Boston 10, Mass. — Listing No. 28

Cold Work Dies (Blanking)	KETOS Oil Hardening	O1	C .90, Mn 1.25, Cr .50, W .50	Oil
Cold Work Dies (Blanking)	HALDI #2 Air Hardening	D2	C 1.50, Cr 11.50, Mo .80, V .20	Air, Oil or Liquid Bath
Cold Work Dies (Blanking)	HAWK AIRFAK Air Hardening	A2	C 1.00, Mn .40, Cr 5.25, Mo 1.15, V .40	Air, Oil or Liquid Bath
Cold Work Dies (Blanking) (Ground Stock)	HAWK PREFAK Oil Hardening	O1	C .90, Mn 1.25, Cr .50, W .50	Oil

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking)	HAWK 777 Oil Hardening		C .70, Mn .90, Mo .80, Si .30	Oil
Cold Work Dies (Blanking)	HAWK 977 Oil Hardening		C .90, Mn .90, Mo .80, Si .30	Oil
Cold Work Dies (Blanking)	MARATHON Air Hardening	D3	C 2.25, Cr 11.50, Mo .80, V .20	Air, Oil or Liquid Bath
Cutting Tools (General Purpose)	DREADNOUGHT High Speed	T1	C .73, Cr 4.00, W 18.00, V 1.15	Air, Oil or Liquid Bath
Cutting Tools (Roughing)	HALCOMB 440 High Speed	T6	C .80, Cr 4.00, W 19.50, Mo .60, V 2.00, Co 12.00	Air, Oil or Liquid Bath
Cutting Tools (Roughing)	HALCOMB 999 High Speed	T8	C .80, Cr 4.10, W 14.00, Mo .80, V 2.00, Co 5.00	Air, Oil, Salt
Cutting Tools (General Purpose)	M-2 DREADNOUGHT High Speed	M2	C .83, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Air, Oil or Liquid Bath
Cutting Tools (Finishing)	M-3 DREADNOUGHT High Speed	M3	C 1.05, Cr 4.00, W 5.75, Mo 5.60, V 2.50	Air, Oil or Liquid Bath
Cold Work Dies (Striking)	HAWK ADAMANT Oil Hardening	W1	C .50, Mn .50, Cr 1.12, Ni 3.25 Mo .25	Oil, Air or Liquid Bath
Cold Work Dies (Cold Forming)	HAWK BRAND Water Hardening	W1	C 1.00/1.10	Water, Brine
Cold Work Dies (Cold Forming)	HAWK COLD HEADING DIE Water Hardening	W1	C .85/.95	Water, Brine
Cold Work Dies (Cold Forming)	HAWK SPECIAL Water Hardening	W1	C 1.20/1.30	Water, Brine
Cold Work Dies (Cold Forming)	HAWK VANADIUM Water Hardening	W2	C .95/1.05, V .15/.30	Water, Brine
Cold Work Dies (Cold Forming)	KROMIL Water Hardening	S5	C .60, Mn .75, Si 1.90, Cr .35, Mo .30	Water, Oil
Cold Work Dies (Forming & Cutting Tools)	LIBERTY Water Hardening		C 1.20, Cr .30, W 1.25	Water, Brine
Hot Work Dies (Plastic Molding Dies)	PYRO Oil Hardening		C .45, Mn .70, Si .25, Cr 1.00, V .20	Oil
Hot Work Dies (Forming, Punching, Shearing)	HALCOMB 218 Air Hardening	H11	C .40, Cr 5.00, Mo 1.35, V .35, Si 1.00	Air, Oil or Liquid Bath
Plastic Molding Dies (Ejector Pins)	CLAREMONT DRILL ROD Water or Oil Hardening	W1	C 1.00	Water, Oil
Plastic Molding Dies (Machine Cut Cavity)	MIRROR FINISH TYPE 420 Oil Hardening		C .30, Mn 1.00 max., Si 1.00 max., Cr 13.00	Oil
Shock Resisting (Intermittent Impact)	STANDARD Water Hardening	W1	C .90/1.00	Water, Brine
Special Roll Steel (Metal Working Rolls)	HAWK H ROLL STEEL Water Hardening	L7	C .85/1.10, Mn .30/.60, Si .15/.30, Cr 1.00/1.50, V .15/.30	Water, Oil

HAYNES STELLITE CO., 30 E. 42nd St., New York 17, N. Y. — Listing No. 29

Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed, Feed, Heavy Cut)	STELLITE Star J-Metal Alloy (Cast Alloy)	Cr 32, W 17, Co 41, C 2.50	
Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed and Feed)	STELLITE #3 Alloy (Cast Alloy)	Cr 30, W 11, Co 52, C 2.50	
Cutting Tools (Roughing, Finishing) (Withstands Severe Shock)	STELLITE #19 Alloy (Cast Alloy)	Cr 31, W 10, Co 53, C 1.50	* These alloys are available in castings for the services specified. Hastelloy alloy C and Stellite alloy No. 6 are also recommended for shock resisting service.
Cutting Tools (Roughing, Finishing) (Moderate Impact, High Speed)	STELLITE 98 M2 Alloy (Cast Alloy)	Cr 30, W 18, Co 38, C 2.00	
Hot Punching, Hot Shearing (Hard-Facing Material)	HASTELLOY ALLOY C* Nickel Base Alloy	Cr 16, W4, Mo 17, Fe 6, Ni Bal C .15 max	
Hot Punching, Hot Shearing (Hard-Facing Material)	STELLITE ALLOY No. 6* Cast Alloy	Cr 30, W 5, Co 56, C 1.25	
Shock Resisting (Hard-Facing Material)	STELLITE ALLOY NO. 12* Cast Alloy	Cr 31, W 8, Co 56, C 1.35	

HEPPENSTALL CO., 4620 Hatfield St., Pittsburgh 1, Pa. — Listing No. 30

Cold Shearing	EIS R43 Oil, Air Hardening	C 1.55, Mn .25, Cr 11.50, W .75, Mo .75, Si .35	Air, Oil
Cold Shearing	EIS R45 Oil, Air Hardening	C .35, Mn .25, Cr 11.50, Mo .45, Si .35	Air, Oil
Cold Shearing	EIS R97 Oil Hardening	C .58, Mn 1.00, Cr .30, Mo .40, Si 2.15	Oil
Cold Shearing	EIS V2 Water Hardening	C .80, Mn .40, V .10, Si .60	Water
Cold Shearing	EIS V3 Water Hardening	C .95, Mn .40, V .10, Si .60	Water
Cold Work Dies	(See EIS R43, EIS R45, Listed Above)		
Cold Work Dies	2V72 Water Hardening	C .80, Mn .40, V .10, Si .60	Water
Cold Work Dies	2V90 Water Hardening	C .95, Mn .40, V .10, Si .60	Water
Diecasting Dies (Zinc, Aluminum)	EIS H720 Oil, Air Hardening	C .40, Mn .30, Si 1.00, Cr 5.25, Mo 1.10, V 1.00	Air, Oil
Diecasting Dies (Zinc, Aluminum)	EIS T721 Oil, Air Hardening	C .35, Mn .35, Si 1.00, Cr 5.00, Mo 1.50, W 1.25, V .20	Air, Oil
Diecasting Dies (Lead, Zinc)	MOLDTEM Prehardened	C .35, Mn .75, Si .30, Cr 1.00, Mo .45, V .10	
Hot & Cold Trimming	EIS H41 Oil, Air Hardening	C .95, Mn .30, Cr 4.00, M .25, V .20, Si .25	Air, Oil

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot & Cold Trimming	EIS T51 Oil Hardening		C .65, Mn .70, Cr .70, W 2.25, Si .30, Ni 1.50	Oil
Hot Shearing	EIS RT18 Oil, Air Hardening		C .35, Mn .30, Cr 5.00, Mo 2.00, Si 1.00	Air, Oil
Hot Shearing	EIS T73 Oil, Air Hardening		C .28, Mn .30, Cr 3.50, W 9.00, V .25, Si .45	Air, Oil
Hot Shearing	EIS T77 Oil, Air Hardening		C .33, Mn .30, Cr 4.00, W 12.00, V .25, Si .30	Air, Oil
Hot Work Dies	"C" ANNEAL Oil Hardening		C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	Oil
Hot Work Dies	C55 Oil Hardening		C .55, Mn .50, Cr .90, Mo .30, Si .25, Ni 1.50	Oil
Hot Work Dies	5H50 Oil Hardening		C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	Oil
Hot Work Dies	HARDTEM Prehardened		C .55, Mn .80, Cr 1.00, Mo .45, V .08, Si .25	
Hot Work Dies	SUPER HARDTEM Prehardened		Special Ni-Cr-Mo-V	
Hot Work Dies	PRENEAL Oil, Air Hardening		Special Precipitation Hardening Alloy Steel	Air, Oil
Hot Work Dies	PRESTEM Prehardened		Special Precipitation Hardening Alloy Steel	
Hot Work Dies	SUPER PYRONEAL Oil, Air Hardened		Special Cr-Mo-Si-Ni	Air, Oil
Hot Work Dies	PYRONEAL Oil, Air Hardening		C .55, Mn .60, Cr 1.00, Mo .75, Si .60, Ni 2.15	Air, Oil
Hot Work Dies	SUPER PYROTEM Prehardened		Special Cr-Mo-Si-Ni	Air, Oil
Hot Work Dies	PYROTEM Prehardened		C .55, Mn .60, Cr 1.00, Mo .75, Si .60, Ni 2.15	
Hot Work Dies	THERMONEAL Oil, Air Hardening		C .35, Mn .30, Si 1.00, Cr 5.00, Mo 2.00	Air, Oil
Hot Work Dies	THERMOTEM Prehardened			
Hot Work Dies	(See EIS T73, EIS T77, EIS T721, EIS RT18, Listed Above)			
Plastic Molding Dies	MOLDTEM Prehardened		C .35, Mn .75, Si .30, Cr 1.00, Mo .45, V .10	

HIDALGO STEEL CO., 74 Varick St., New York, N. Y. — Listing No. 31

Chisels, Shear Blades, Punches	UNICO Water Hardening		Tungsten chromium steel	
Dies	CHROME B Oil Hardening			
Hand Bull Points, Chisels, Fire Tools	MILO Water Hardening		C .35 to .45, Mn 1.00 to 1.10	
High Speed	COBALT			
High Speed	JANO		Cr 1.00, W 18, Va 2.00, Mo .75	
Pneumatic Chisels, Punches	FUEGO			
Punches, Chisels, Shear Blades	COLOSSO No Draw Steel			
Shear Blades, Chisels	HIDALGO		Cr 1.00, W 1.50 to 2.00	

HOUGHTON & RICHARDS INC., 19 Jersey St., Boston 15, Mass. — Listing No. 32

Brake Dies	H & R BRAKE DIE		C .50, Mn 1.00, Cr .95, Mo .20	
Carbide Shank Steel	H & R No. 8 Water, Oil Hardening	S5	C .60, Mn .70, Mo .45, V .20, Si 1.85	Water, Oil Mach. 65 Movement + B
Carbide Shank Steel	H & R No. 8M Water, Oil Hardening	S4	C .55, Mn .75, Mo .20, Si 2.00	Water, Oil Mach. 85 Movement + B
Carbide Shank Steel	H & R N150 Oil Hardening	L6	C per temper, Mn .55, Cr .85, Mo .42, Si .30, Ni 1.40	Oil Mach. 75 Movement + A
Cold Heading	H & R HEADING DIE Water Hardening	W1	C .90-1.00, Mn .20, Si .30	Brine Mach. 100 Movement + C
Cold Work Dies (Cold Forming)	H & R No. 135 Water Hardening	L7	C 1.00, Mn .35, Cr 1.45, Si .35	Oil, Water Mach. 90 Movement —A
Cold Work Dies (Blanking, Cold Forming)	H & R GOLD LABEL Water Hardening	F3	C 1.40, Mn .25, W 4.00, Cr .50, Si .20, V .30	Water Mach. 65 Movement —B
Cold Work Dies (Blanking, Cold Forming)	H & R K Oil Hardening	D3	C 2.32, Mn .32, Cr 13.00, V .22, Si .22	Oil Mach. 40 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2 Oil, Air Hardening	D2	C 1.50, Mn .25, Cr 11.50, Mo .75, V .25, Si .30	Oil, Air Mach. 45 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-2L Air, Oil Hardening	D1	C .85, Ni 1.00, Mo .45, Cr 11.50, V .30	Oil, Air Mach. 50 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R K-3 Air Hardening	D7A	C 2.40, Si .25, Mn .25, Cr 13.00, V 4.00, Mo 1.00	Air Mach. 40 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 50 Oil Hardening	H26	C .55, Mn .25, Cr 4.10, W 18.00, V 1.13, Si .25	Oil Mach. 55 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R OIL HARDENING Oil Hardening	O2	C .95, Mn .95, Cr .55, Si .30	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming)	H & R TUNGSTEN OIL HARDENING Oil Hardening	O1	C .90, Mn 1.10, Cr .50, W .50, V .20, Si .25	Oil Mach. 90 Movement + B
Cold Work Dies (Blanking, Cold Forming)	H & R No. 19 Oil Hardening	O2	C .92, Mn 1.55, Cr .18, Si .32	Oil Mach. 90 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 60 Water, Oil Hardening	O7	C 1.20, Mn .25, Cr .70, W 1.60, Mo .25, V .20, Si .30	Water, Oil Mach. 85 Movement + A

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cold Work Dies (Blanking, Cold Forming)	H & R No. 61 Air Hardening	D5	C 1.35, Mn .25, Cr 12.12, Mo .64, Co 3.04, Si .50	Air Mach. 60 Movement + A
Cold Work Dies (Blanking, Cold Forming)	H & R No. 80 Air Hardening	A2	C 1.00, Mn .65, Cr 5.25, Mo 1.10, V .25, Si .20	Air Mach. 85 Movement + A
Cutting Tools (Finishing)	H & R No. 44 High Speed	M50	C .80, Mn .30, Cr 4.10, Mo 4.25, V 1.10, Si .25	Oil Mach. 60 Movement + A
Cutting Tools (Finishing)	H & R No. 59 High Speed	M52	C .88, Mn .30, Cr 4.10, Mo 4.25, V 1.82, Si .25	Oil Mach. 55 Movement + A
Cutting Tools (Finishing)	H & R No. 434 High Speed	M54	C 1.18, Mn .30, Cr 4.10, Mo 4.25, V 3.15, Si .25	Oil Mach. 50 Movement + A
Cutting Tools (Finishing)	H & R No. 444 High Speed	M56	C 1.40, Mn .30, Cr 4.10, Mo 4.25, V 4.15, Si .25	Oil Mach. 45 Movement + A
Cutting Tools (Roughing)	H & R SUPER COBALT High Speed	T6	C .80, Mn .20, Cr 4.25, W 20.50, Mo .60, V 1.35, Co 12.25, Si .32	Oil, Air, Salt Bath Mach. Movement + A 40
Cutting Tools (Roughing)	H & R No. 4 High Speed	T5	C .80, Cr 4.50, W 18.50, Mo .80, V 1.75, Co 7.50	Oil, Air, Salt Bath Mach. Movement + A 45
Cutting Tools (Roughing)	H & R No. 43 High Speed	M30	C .81, Mn .30, Cr 4.10, W 1.70, Mo 8.30, V 1.25, Co 5.00, Si .30	Oil Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	H & R COBALT High Speed	T4	C .78, Cr 4.00, W 18.00, V 1.00, Co 5.00	Oil, Air, Salt Bath Mach. Movement + A 50
Cutting Tools (Roughing, Finishing)	H & R COBALT MOLY High Speed	M36	C .88, Mn .25, Cr 4.10, W 6.00, Mo 6.00, V 1.90, Co 9.00, Si .25	Oil Mach. 45 Movement + A
Cutting Tools (Roughing, Finishing)	H & R MOLYHI High Speed	M1	C per temper, Cr 4.00, W 1.50, Mo 8.50, V 1.15	Oil, Air, Salt Bath Mach. Movement + A 55
Cutting Tools (Roughing, Finishing)	H & R MOLY VAN High Speed	M10	C .82, Cr 4.00, Mo 9.00, V 2.20	Oil, Air, Salt Bath Mach. Movement + A 60
Cutting Tools (Roughing, Finishing)	H & R SUPER MOLYHI High Speed	M30	C .82, Mn .25, Cr 4.00, W 1.50, Mo 8.50, V 1.25, Co 5.00, Si .32	Oil, Air, Salt Bath Mach. Movement + B 50
Cutting Tools (Roughing, Finishing)	H & R No. 1 High Speed	T1	C .70, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .30	Oil, Air, Salt Bath Mach. Movement + A 55
Cutting Tools (Roughing, Finishing)	H & R No. 2 High Speed	T2	C .80, Cr 4.25, W 18.50, Mo .65, V 2.15, Si .35	Oil, Air, Salt Bath Mach. Movement + A 45
Cutting Tools (Roughing, Finishing)	H & R No. 3 High Speed	T3	C 1.04, Mn .26, Cr 4.18, W 18.46, Mo .84, V 3.41, Si .27	Oil, Air, Salt Bath Mach. Movement + A 50
Cutting Tools (Roughing, Finishing)	H & R No. 7 High Speed	M3	C 1.15, Mn .25, Cr 4.00, W 6.00, Mo 6.00, V 3.00, Si .25	Oil Mach. 50 Movement + A
Cutting Tools (Roughing, Finishing)	H & R No. 57 High Speed	M2	C .80, Mn .25, Cr 4.00, W 6.00, Mo 5.00, V 1.90, Si .25	Oil, Air, Salt Bath Mach. Movement + A 55
Cutting Tools (Roughing, Finishing)	H & R No. 445 High Speed	T15	C 1.50, W 13.50, Cr 4.50, V 4.75, Co 5.00, Mo .50	Oil Mach. 40 Movement + A
Cutting Tools (Also Hot and Cold Work Dies)	H & R No. 45 High Speed	H42	C .65, W 6.50, Cr 4.00, V 2.00, Mo 5.00	Oil Mach. 60 Movement + A
Diecasting Dies	H & R HOT WORK No. 5 (Hot Work Type)	H13	C .35, Mn .35, Cr 5.00, Mo 1.00, Si 1.00, V 1.00	Air Mach. 65 Movement + A
Diecasting Dies	H & R HOT WORK No. 6 (Hot Work Type)	H12	C .35, Mn .35, Cr 5.00, W 1.35, Mo 1.75, Si 1.00	Air Mach. 75 Movement + A
Diecasting Dies	H & R HOT WORK No. 7 (Hot Work Type)	H12	C .55, Mn .30, Cr 5.00, W 1.20, Mo 1.20, Si .95	Air, Oil Mach. 85 Movement + A
Diecasting Dies	H & R No. 55 High Speed	H14	C .35, Mn .25, Cr 5.25, W 5.25, Mo .20, V .20, Co .50, Si .90	Air Mach. 65 Movement + A
Heading Dies	H & R SPECIAL HEADING DIE Water Hardening	W1	C .90-1.00, Mn .20, Si .30	Brine Mach. 100 Movement + C
Hot Work Dies (Hot Forming)	H & R No. 550 (Hot Work Type)	H41	C .30, Si .40, W 1.00, Mo 6.25, Cr 3.75, V .75	Oil Mach. 75 Movement + B
Hot Work Dies (Hot Forming)	H & R HOT WORK No. 12 (Hot Work Type)	H23	C .30, Mn .35, Cr 12.00, W 12.00, V .90, Si .50	Air, Oil Mach. 50 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK (Hot Work Type)	H22	C .32, Cr 3.25, W 10.25, V .40, Si .28	Oil, Dry Air Blast Mach. Movement + A 60
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 2 (Hot Work Type)	H21	C .33, Mn .20, Cr 3.50, W 9.25, V .50, Si .30	Oil, Water Mach. 60 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 4 (Hot Work Type)	H7A	C .97, Mn .35, Cr 3.90, Si .35	Air Blast Mach. 80 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R HOT WORK No. 15 (Hot Work Type)	H25	C .25, Mn .29, Cr 4.03, W 15.10, V .51, Si .26	Oil Mach. 65 Movement + A
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	MYA Oil Hardening	H8A	C .42, Mn .30, Cr 1.45, V .25, Si 1.45	Oil Mach. 55 Movement + B
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	H & R No. 225 Oil, Air Hardening	S1	C .50, Mn .25, Cr 1.50, W 2.50, V .25, Mo .50 max	Oil, Air Mach. 80 Movement + A
Hot Work Dies (Hot Punching, Hot Shearing)	H & R No. 555 Hot Work Type	H41	C .50, Si .50, W 1.00, Mo 6.25, Cr 3.75, V .75	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming, Hot Punching, Hot Shearing)	(See H & R HOT WORK No. 5, H & R HOT WORK No. 6, H & R No. 55, Listed Above)			
Pistons	H & R PISTON Water Hardening	W5	C 1.14, Mn .32, Cr .58, V .19, Si .21	Water Mach 80 Movement + C
Plastic Molding Dies (All Types)	MYA (Listed Above)			
Plastic Molding Dies (Machined Cavity Dies)	H & R MULTIMOLD Oil Hardening	P20	C .35, Mn .70, Si .45, Cr .80, Mo .30	Oil
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD Air Hardening	P4	C .07, Mn .40, Si .25, Cr 4.50, Mo .45	Air Movement + A
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD B Oil Hardening	P5	C .06, Mn .30, Si .15, Cr 1.00, Mo .25, Boron Added	Oil Movement + B
Plastic Molding Dies (Hobbing)	H & R PLASTIC MOLD C Oil Hardening	P1	C .06, Mn .15, Si .10	Oil Movement + B
Punching and Shearing	H & R CARBON Water Hardening	W1	C .90-1.05 or as specified, Mn .25, Si .20	Water, Brine Mach. 100 Movement + C
Punching and Shearing	H & R Non-Tempering Water, Oil Hardening	S6A	C .35, Mn .70, Cr .80, Mo .30, Si .45, Cu .30	Water, Oil Mach. 80 Movement ±B
Punching and Shearing	H & R SPECIAL CARBON Water Hardening	W1	C .90-1.05 or as specified, Mn .25, Si .20	Water, Brine Mach. 100 Movement + C
Punching and Shearing	H & R VANADIUM Water Hardening	W2	C 1.05-1.15, Mn .25, V .18, Si .20	Water, Brine Mach. 100 Movement + C

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Punching and Shearing	(See H & R OIL HARDENING, H & R TUNGSTEN OIL HARDENING, H & R No. 19, H & R No. 60, H & R No. 225, Listed Above)			
Shock Resisting (Intermittent Impact)	H & R No. 15 Oil Hardening	L2	C .45, Mn .55, Cr .95, V .20	Oil Mach. 80 Movement + B
Shock Resisting (Intermittent Impact)	H & R No. 85 Oil Hardening	L2	C .50, Mn .80, Cr .95, V .20, Si .25	Oil Mach. 73 Movement — B
Shock Resisting (Repeated, Intermittent Impact)	(See MYA, H & R No. 60, Listed Above)			
Shock Resisting (Repeated Impact)	H & R SILICO Water, Oil Hardening	S2	C .50, Mn .45, Mo .50, V .20, Si 1.10	Water, Oil Mach. 62 Movement + B

HOYLAND STEEL CO. INC., 405 Lexington Ave., New York 17, N. Y. — Listing No. 33

Cold Work Dies	HSC COLD HEADER DIE STEEL... Water Hardening	W1	(Secure special information from manufacturer)	
Cold Work Dies	HSC-CVM Air Hardening	A2	C .95-1.05, Mn .60-.80, Cr 5.00-5.50, Mo .95-1.25, V .20-.30, Si .20-.40	Air
Cold Work Dies	HSC-CW-OIL Oil Hardening	O1	C .85-.95, Mn 1.00-1.20, Cr .40-.60, W .40-.60, Si .25-.45	Oil
Cold Work Dies	HSC SPECIAL Water Hardening	W1	C 1.00-1.20, Mn .25-.35, Si .20-.30	Water
Cold Work Dies	HSC-88-EXTRA Water Hardening	W1	C 1.00-1.10, Mn .25-35, Si .25-.35	Water
Cold Work Dies	HSC-350 Water Hardening		C 1.25-1.35, Mn .20-.40, W 3.00-4.00, Si .45	Water
Cold Work Dies (Blanking)	HSC-265 Oil, Air Hardening	D2	C 1.55-1.70, Mn .25-.35, Cr 11.50-12.50, Mo .70-.90, V .15-.25, Si .25-.35	Air, Oil
Cold Work Dies (Blanking)	HSC-265-H	D3	C 2.05, Mn .40, Cr 11.50, V .60	Air, Oil
Cold Work Dies (Stamping & Forming)	HSC-L97		C .55, Cr 1.00, Ni 3.00, Mo .35	Air, Oil
Cold Work Tools	HSC REGULAR Water Hardening	W1	C as specified, Mn .20-.35, Si .25-.35	Water
Cutting Tools (Roughing)	HSC COBALT 5 Oil, Air Hardening	T4	C .68-.75, Mn .10-.30, Cr 3.75-4.25, W 16.75-17.75, Mo .40-.60, V .95-1.15, Co 4.25-4.75, Si .25-.40	Oil, Air
Cutting Tools (Roughing)	HSC 6-6-2 Oil, Air Hardening	M2	C .75-.85, Mn .20-.30, Cr 3.90-4.30, W 5.50-6.00, Mo 4.50-5.50, V 1.40-1.75, Si .20-.40	Oil, Air
Cutting Tools (Roughing)	HSC 18-4-1 Oil, Air Hardening	T1	C .70-.75, Mn .10-.30, Cr 3.75-4.25, W 17.50-18.50, V .95-1.15, Si .25-.40	Oil, Air
Cutting Tools (Finishing)	(See HSC Special, HSC-88-EXTRA, HSC-350, Listed Above)			
Diecasting Dies	HSC-33-HV	H13	C .40, Si 1.00, Cr 5.25, Mo 1.25, V 1.05	Air
Hot Work Dies	HSC-33 Air Hardening	H12	C .30-.35, Mn .30-.40, Cr 4.50-5.00, W 1.00-1.20, Mo 1.40-1.60, Si .80-1.00	Air
Hot Work Dies	HSC-310 Oil, Air Hardening	H21	C .28-.33, Mn .20-.30, Cr 3.00-3.50, W 9.50-10.50, V .25-.50, Si .20-.40	Oil, Air
Hot Work Dies	HSC-313 Oil, Air Hardening	H25	C .35-.40, Mn .20-.35, Cr 2.75-3.25, W 13.00-14.00, Si .20-.40	Oil, Air
Hot Work Dies	HSC-515 Air Hardening		C .35-.40, Mn .20-.35, Cr 4.80-5.30, W 4.80-5.30, Mo .15-.30, Si .80-1.10	Air
Hot Work Dies	HSC-33	(Listed Above)		
Plastic Molding Dies	REMA Water Hardening		C .05-.07, Mn .15-.20	
Plastic Molding Dies	REMA B		C .07, Mn .30, Si .15, Cr 1.00, Mo .25	Oil
Shock Resisting (Repeated Impact)	HSC 280 Water Hardening	S5	C .50-.55, Mn .60-.80, Mo .30-.40, Si 1.30-1.60	Water
Shock Resisting (Repeated Impact)	HSC 422 Water, Oil Hardening	S1	C .45-.50, Mn .20-.50, Cr .85-1.05, W .90-1.20, Mo .15-.25, Si .15-.30	Water, Oil

JAMISON STEEL CORP., 2168 E. Olympic Blvd., Los Angeles 21, Calif. — Listing No. 34

Cold Work Dies (Blanking, Cold Forming)	AIRTREAT Air Hardening		C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .20, Si .25	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	DENSITE Air Hardening		C 1.50, Mn .30, Cr 12.00, Mo .85, V .85, Si .40	Air Movement A
Cold Work Dies (Blanking, Cold Forming)	JAMISON SPECIAL Water Hardening		C 1.00, Mn .25, Cr .16, V .05, Si .25	Water Movement C
Cold Work Dies (Blanking, Cold Forming)	K-46 Oil Hardening Non Deforming		C .90, Mn 1.15, Cr .50, W .50, V .10, Si .25	Oil Movement A
Cold Work Dies	MOLY-TUNGSTEN HIGH SPEED STEEL		C .82, Mn .25, Cr 4.15, W 6.20, Mo 5.00, V 1.90, Si .25	Oil, Air Movement A
Cold Work Dies	18-4-1 HIGH SPEED STEEL		C .72, Mn .25, Cr 4.10, W 18.20, V 1.15, Si .30	Oil, Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear)	DIECAST #1 Air Hardening, Heat Resistant		C .37, Cr 5.25, Mo 1.35, V .50	Air Movement A
Hot Work Dies (Hot Forming, Punch & Shear, Shock Resistant)	HICKORY Oil Hardening, Shock Resistant		C .50, Si .90, Mn .25, Cr 1.05, W 2.45	Oil Movement B

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
JESSOP STEEL CO., 500 Green St., Washington, Pa.				**Listing No. 35**
Cold Heading	NEW PROCESS COLD HEADER Water Hardening	W1	C 1.00, Mn .25, Si .18	Water Mach. 100 Movement B
Cold Work (Dies, Rolls, etc.)	3-C CAST-TO-SHAPE		C 1.55, Cr 13.00, Ni .15, Mo 1.15, V .55, Co .70	Air Mach. 60 Movement A
Cold Work (Dies, Rolls, etc.)	3-C EXTRA-CAST-TO-SHAPE		C 1.55, Cr 13.00, Ni .40, Mo 1.15, Co 1.10	Air Mach. 60 Movement A
Cold Work (Dies, Rolls, etc.)	3-C SPECIAL-CAST-TO-SHAPE	D5	C 1.55, Cr 13.00, Ni .40, Mo 1.15, V .50, Co 3.25	Air Mach. 60 Movement A
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-1 Air Hardening	D2	C 1.50, Mn .30, Cr 12.00, Mo .75, V .80, Si .40	Air Mach. 75 Movement B
Cold Work Dies (Lamination Dies, etc.)	C.N.S.-2 Oil Hardening	D3	C 2.25, Mn .42, Cr 12.00, V .20, Si .45	Oil Mach. 75 Movement B
Cold Work Dies	DICA (Flame Hard.) CAST-TO-SHAPE		C .42, Mn .75, Si .25, Cr 1.00, Mo .20	Oil Mach. 85 Movement B
Cold Work Dies	LION EXTRA Water Hardening	W1	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cold Work Dies	LION Water Hardening	W1	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cold Work Dies	SPECIAL OIL HARDENING Oil Hardening	O2	C .90, Mn 1.75, Cr .20, Si .35	Oil Mach. 100 Movement A
Cold Work Dies	TRUFORM-CAST-TO-SHAPE	O1	C 1.00, Mn 1.15, Si .35, Cr .50, W .50	Oil Mach. 90 Movement B
Cold Work Dies	TRUFORM Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, Si .30, V .20	Oil Mach. 90 Movement A
Cold Work Dies	WASHINGTON Water Hardening	W1	C .60/1.30, Mn .30, Si .25	Water Mach. 100 Movement B
Cold Work Dies (Lamination Dies, etc.)	WINDSOR Air Hardening	A2	C 1.00, Mn .50, Cr 5.00, Mo 1.25, V .30, Si .25	Air Mach. 75 Movement B
Cold Work Dies	WINDSOR—CAST-TO-SHAPE	A2	C 1.00, Mn .35, Cr 5.25, Mo 1.00, V .25	Air Mach. 75 Movement A
Cold Work Dies & Cams	3312—CAST-TO-SHAPE		C .12, Mn .45, Si .22, Ni 3.40, Cr 1.40	Oil Mach. 85 Movement B
Cutting Tools	M-3 High Speed	M3	C 1.03, Mn .30, Cr 4.00, W 6.00, V 2.50, Mo 5.50	Air, Oil Mach. 60 Movement B
Cutting Tools	M-10 High Speed	M10	C .86, Mn .30, Cr 4.00, V 2.00, Mo 8.50	Air, Oil Mach. 60 Movement B
Cutting Tools	T-8 High Speed	T8	C .79, Mn .30, Cr 4.00, W 14.00, V 2.00, Mo .75, Co 5.00	Air, Oil Mach. 60 Movement B
Cutting Tools	MOGUL High Speed	M1	C .78, Mn .25, Cr 3.80, W 1.50, Mo 8.70, V 1.15, Si .30	Oil Mach. 60 Movement B
Cutting Tools	MUSTANG High Speed	M2	C .84, Mn .25, Cr 4.20, W 6.35, Mo 5.00, V 1.95, Si .25	Oil Mach. 60 Movement B
Cutting Tools	PURPLE LABEL High Speed	T4	C .74, Mn .28, Cr 4.20, W 18.50, Mo .50 max., V 1.10, Co 5.00	Oil Mach. 60 Movement B
Cutting Tools	PURPLE LABEL EXTRA High Speed	T5	C .78, Mn .28, Cr 4.20, W 18.50, Mo .75, V 1.95, Co 7.90	Oil Mach. 60 Movement B
Cutting Tools	KING COBALT High Speed	T6	C .78, Mn .30, Cr 4.20, W 19.50, Mo .75, V 1.75, Co 11.50	Oil Mach. 60 Movement B
Cutting Tools	SUPREMUS High Speed	T1	C .73, Mn .28, Cr 4.00, W 18.00, V 1.10	Oil Mach. 60 Movement B
Cutting Tools	SUPREMUS EXTRA High Speed	T2	C .85, Mn .30, Cr 4.00, W 18.50, Mo .75, V 2.10	Oil Mach. 60 Movement B
Cutting Tools	RAPID FINISHING Water Hardening		C 1.35, Mn .35, Cr .75, W 3.75	Water Mach. 85 Movement B
Cutting Tools	(See C.N.S.-1, C.N.S.-2, TRUFORM, WINDSOR, Listed Above.)			
Cutting Tools (Roughing, Finishing)	(See LION, LION EXTRA, WASHINGTON, RAPID FINISHING, Listed Above.)			
Diecasting Dies	DICA B Air Hardening	H12	C .35, Mn .35, Cr 5.00, W 1.15, Mo 1.50, V .20, Si 1.00	Air Mach. 75 Movement B
Diecasting Dies	3-C SPECIAL Air Hardening	D5	C 1.55, Mn .30, Cr 13.00, Mo 1.15, Co 3.25, Ni .40, V .50	Air Mach. 75 Movement B
Gages	(See TRUFORM, SPECIAL OIL HARDENING, Listed Above.)			
Hot Work Dies	DICA B—MOD. CAST-TO-SHAPE	H11	C .35, Mn .40, Si .95, Cr 4.85, V .35, Mo 1.40	Air Mach. 75 Movement B
Hot Work Tools & Dies	DICA B—MODIFIED	H11	C .36, Mn .35, Cr 4.85, V .20, Mo 1.50	Air Mach. 75 Movement B
Hot Work Tools & Dies	DICA B—VANADIUM	H13	C .36, Mn .35, Cr 4.85, V 1.00, Mo 1.50	Air Mach. 75 Movement B
Hot Work Tools & Dies	J HOT WORK Air Hardening		C .62, Mn .30, Si .35, Cr 3.80, Mo .55, V .55	Air Mach. 75 Movement B
Hot Work Tools & Dies	JJ HOT WORK Air Hardening		C .92, Mn .30, Si .35, Cr 3.80, Mo .55, V .55	Air Mach. 75 Movement B
Hot Work Tools & Dies	2B-HC Oil Hardening		C .47, Mn .30, Si .30, Cr 2.75, W 11.25, V .30	Oil, Air Mach. 75 Movement B
Hot Work Tools & Dies	2B-LC Oil Hardening	H21	C .30, Mn .30, Si .30, Cr 3.00, W 10.00, V .30	Oil, Air Mach. 75 Movement B
Hot Work Tools & Dies	2B-MC Oil Hardening		C .37, Mn .30, Si .30, Cr 3.00, W 13.50, V .30	Oil, Air Mach. 75 Movement B
Shear Blades, Chisels, Dies, Forming Tools, Punches	RTS Water Hardening	S2	C .55, Mn .50, Mo .45, Si .80	Water, Oil Mach. 90 Movement B
Shock Resisting Tools, Chisels	MAGIC Oil Hardening		C .52, Mn .90, Mo 1.00, Si 2.00	Water, Oil Mach. 75 Movement B
Shock Resisting Tools, Chisels	No. 250	S5	C .52, Mn .95, Si 2.00, Mo .50, V .20, Cr .15	Water, Oil Mach. 75 Movement B
Shock Resisting Tools, Shear Blades (Pneumatic Tools)	TOP NOTCH Oil Hardening	S1	C .50, Mn .30, Cr 1.15, W 2.40, V .20	Oil Mach. 80 Movement B
Tools & Dies (Shallow Hardening)	(See NEW PROCESS COLD HEADER, WASHINGTON, Listed Above)			

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium, ★ % Machinability Annealed Movement in Hardening.

KENNAMETAL INC., Latrobe, Pa. — Listing No. 36

Cutting Tools (Heavy rough turning, forged, rolled steel)....KM, Carbide
Cutting Tools (Moderate finishing cuts, steel) .....K3H, Carbide
Cutting Tools (Heavy roughing, cast steel, scaly, sandy cast iron) .....K2S, Carbide
Cutting Tools (General machining of steel) .....K21, Carbide
Cutting Tools (Abrasive cuts on steel, large nose radius, or tools that dwell) .....K4H, Carbide
Cutting Tools (Hard steels, precision boring) .....K5H, Carbide
Cutting Tools (High velocity cutting, steel, inserts only)....K7H, Carbide
Cutting Tools (Heavy roughing or planing of cast iron) .....K1, Carbide
Cutting Tools (General machining, cast iron, nonmetallics)...K6, Carbide
Cutting Tools (Fine finishing, precision boring on cast iron)..K8, Carbide
Cutting Tools (Fine finishing cuts on nonferrous and plastics) .....K11, Carbide
Dies, Cold Draw, Nongalling (Wire, Rod, Tube. Burnishing, Flaring) .....K86, Carbide
Dies, Cold Draw, Nongalling (Bar, Tube. Sizing Mandrels, Wire Flattening Rolls) .....K84, Carbide
Dies, Cold Draw, Nongalling, H.D. (Sizing mandrels H.D. Burnishing Rolls) .....K82, Carbide
Dies, Wear Resistant, No Shock. (Compacting, Blanking, Paper Slitting) .....K96, Carbide
Dies, Wear Resistant, Light Shock. (Light Blanking, Light Heading Hammers) .....K95, Carbide
Dies, Cold Work, Light Shock (Blanking—light to medium, Rivet Heading, Slitters Can Stock).....K94, Carbide
Dies, Cold Work, Medium Shock (Blanking—to 0.040-in. Steel, Heavy Forming Dies, Heading Hammers).....K92, Carbide
Dies, Cold Work, Medium to Heavy Shock. (Blanking—to 1/16-in. Steel. Crushing Hammers, Rivet Sets).....K91, Carbide
Dies, Cold Work, Heavy Shock. (Blanking—3/16-in. Steel, Cold Heading, Nibbling, Swaging) .....K90, Carbide
Heat Resistant Applications (Available in compositions for: Hot Machining, Flash Trimming, Hot Spinning, Hot Die Applications) .....KENTANIUM
Rock Cutting Tools .....K12, Carbide
Wear Resistant Parts (Adaptable to long slender extruded shapes) .....KE7, Carbide

KLOSTER STEEL CORP., 224-228 N. Justine St., Chicago 7, Ill. — Listing No. 37

Cold Work Dies	PURE-ORE AIR-CHROM Air Hardening	C 1.00, Mn .57, Cr 5.30, Mo 1.0, V .26, Si .23	Air
Cold Work Dies	PURE-ORE EN-97	C .58, Mn .40, Cr .80-.90, Mo .42, Si .28, Ni 3.25	Oil
Cold Work Dies	PURE-ORE EXTRA Water Hardening	Carbon as desired	Water
Cold Work Dies	PURE-ORE ROLMO	C 1.00, Mn .29-.35, Cr 1.15-1.25, Mo .35-.40, Si .36	Oil
Cold Work Dies	PURE-ORE SPECIAL Water Hardening	Carbon as desired	Water
Cold Work Dies	PURE-ORE STANDARD Water Hardening	Carbon as desired	Water
Cold Work Dies	PURE-ORE No. 14	C 1.00, Mn .35, Cr .45, Si .23	Water
Cold Work Dies	PURE-ORE No. 25	C 1.20, Mn .35, Cr .60-.80, W 1.30, V .15-.25, Si .30	Water
Cold Work Dies (Blanking, Forming)	PURE-ORE HI-RUN Hi-Chrome, Hi-Carbon	C 1.50-1.60, Mn .35, Cr 11.50-12.50, Mo .75-.90, V .25-.35, Si .40-.50	Air
Cold Work Dies	KLOSTER SWED-OIL Oil Hardening	C .95-1.00, Mn 1.10-1.20, Cr .45-.50, W .45-.50, V .20, Si .25-.35	Oil
Cutting Tools	PURE-ORE CLIPPER High Speed	C .55-.75, Mn .15-.35, Cr 3.80-4.25, W 17.75-18.50, V .90-1.25, Si .20-.35	Oil
Hot Work Dies	PURE-ORE D-C-33 Hot Work	C .33, Mn .20-.40, Cr 4.50-5.50, W 1.35-1.75, Mo 1.45-1.85, Si .85-1.25	Air
Hot Work Dies	PURE-ORE D-C-66 Hot Work	C .30, Mn .31-.43, Cr 3.50, W 8.50-9.00, V .27, Si .29-.38	Air
Hot Work Dies	PURE-ORE KLS-44 Hot Work	C .57, Mn .51, Cr 1.01, Mo .92, Si .28, Ni 1.43	Oil, Air
Shock Resisting	CHIZ-ALLOY	C .45, Mn .30, Cr 1.00-1.25, W 2.50, Si .90, V .20-.25	Oil
Shock Resisting	PURE-ORE SUPER ALLOY	C .45-.50, Mn .35, Cr 1.25, W 2.25-2.50, V .20-.25, Si .90-1.00	Oil

LATROBE STEEL CO., Latrobe, Pa. — Listing No. 38

Cold Work Dies (Blanking, Cold Forming)	BADGER Oil Hardening	O1	C .94, Si .30, Mn 1.20, W .50, Cr .50	Oil — Mach. 90 Movement +A
Cold Work Dies (Blanking, Cold Forming)	BR-4 FM Air Hardening	D7	C 2.30, Si .40, Mn .40, Cr 12.50, V 4.00, Mo 1.10	Air — Mach. 65 Movement +A
Cold Work Dies (Blanking, Cold Forming)	CARBON, SPECIAL, EXTRA AND STANDARD Water Hardening	W1	C 1.05, Si .20, Mn .20, S .015, P .015, Cr .08	Water — Mach. 100 Movement —B
Cold Work Dies (Blanking, Cold Forming)	COBALT CHROME FM Air Hardening	D5	C 1.50, Si .50, Mn .25, Cr 12.25, Mo .85, Co 3.10	Air — Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	GSN FM Oil Hardening	D3	C 2.10, Si .50, Mn .50, Cr 13.00	Oil — Mach. 75 Movement +A
Cold Work Dies (Blanking, Cold Forming)	MGR Air Hardening		C .55, Si .95, Mn .30, W 1.20, Cr 5.00, Mo 1.20	Air — Mach. 85 Movement +A
Cold Work Dies (Blanking, Cold Forming)	OLMPIC FM Air Hardening	D2	C 1.50, Si .30, Mn .30, Cr 12.00, V 1.00, Mo .75	Air — Mach. 80 Movement +A
Cold Work Dies (Blanking, Cold Forming)	SELECT B FM Air Hardening	A2	C 1.00, Si .30, Mn .70, Cr 5.25, V .25, Mo 1.10	Air — Mach. 90 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE CORSAIR XL Oil Hardening, High Speed	M3	C 1.02, W 6.10, Cr 4.00, V 2.40, Mo 6.00	Oil — Mach. 70 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE CRUSADER XL Oil Hardening, High Speed	M3	C 1.20, W 6.00, Cr 4.10, V 3.20, Mo 6.00	Oil — Mach. 70 Movement +A

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
Cutting Tools (Roughing, Finishing)	ELECTRITE DOUBLE SIX M-2 XL. Oil Hardening, High Speed	M2	C .85, W 6.30, Cr 4.15, V 1.85, Mo 5.05	Oil Mach. 75 Movement +A
Cutting Tools (Roughing, Finishing)	ELECTRITE NO. 1 XL Oil Hardening, High Speed	T1	C .75, W 18.00, Cr 4.10, Mo .70, V 1.10	Oil Mach. 75 Movement +A
Diecasting Dies (Zinc)	CASCADE Prehardened		C .20, Si .30, Mn .30, Cr .25, Ni 4.10, V .20, Al 1.20	Mach. 80 Prehardened No Movement
Diecasting Dies (Aluminum, Zinc, Magnesium)	VDC Air Hardening	H13	C .40, Si 1.00, Mn .30, Cr 5.00, Mo 1.20, V 1.00	Air Mach. 80 Movement +A
Gages	(See OLYMPIC FM, SELECT B FM, BADGER Listed Above)			
High-Stress and High-Wear Machinery Parts	STAMINAL Air Hardening		C .55, Si 1.00, Mn .90, Cr .40, Ni 2.70, V .13, Mo .45	Air, Oil Mach. 55 Movement +A
Hot Work Dies (Forming, Punching and Shearing)	(See VDC Listed Above)			
Hot Work Dies (Forming, Punching and Shearing)	CLW Oil Hardening	H21	C .30, Si .45, Mn .25, W 9.15, Cr 3.30, V .50	Oil Mach. 70 Movement +B
Plastic Molding Dies (Machine Cut Cavity Dies)	(See CASCADE Listed Above)			
Punching and Shearing	(See OLYMPIC FM, COBALT CHROME FM, SELECT B FM, MGR, BADGER, STAMINAL, Listed Above)			
Hot Work Dies (Forming, Punching and Shearing)	LPD Air Hardening	H12	C .35, Si 1.00, Mn .30, Cr 5.00, Mo 1.60, W 1.30, V .30	Air Mach. 80 Movement +A
Shock Resisting (Repeated, Intermittent Impact)	(See STAMINAL Listed Above)			
Thermostat Parts	INVAR		C .13, Mn .80, Si .25, Ni 38.00	Mach. 40 Movement O
Wear Parts	(See BR-4 FM Listed Above)			
Plastic Molding Master Hobs	(See MGR & STAMINAL Listed Above)			

LEHIGH STEEL CORP., Bethune & Greenwich Sts., New York 14, N. Y. — Listing No. 39

Blacksmith Tools & Chisels	UTILITY Water Hardening	W1	C .75/1.10	Water Movement C
Cold Work Dies	N-C ALLOY Oil Hardening		C .75, Mn .45, Cr 1.00, Ni 1.65, Si .25	Oil Mach. 80 Movement A
Cold Work Dies	TORPEDO Oil Hardening	O1	C .90/1.05, Mn 1.20, Cr .50, V .20, W .50	Oil Mach. 85 Movement A
Cold Work Dies (Blanking, Cold Forming)	HYCO-1 Oil Hardening	D2	C 1.50, Mn .35, Cr 12.00, Mo .80, V .90, Si .30	Oil Mach. 60 Movement A
Cold Work Dies (Blanking, Cold Forming)	HYCO-2 Air, Oil Hardening	D3	C 2.25, Cr 11.50, Mo .80, V .20, Si .30	Air, Oil Mach. 40 Movement A
Cutting Tools (Roughing)	LEHIGH SS High Speed		C .70, Cr 4.50, Mo .75, Co 11.50, Mn .25, W 18.00, V 1.50, Si .25	Oil Movement B
Cutting Tools (Finishing & Roughing)	LEHIGH XXX High Speed	T-2	C .80, Cr 4.25, W 18.00, V 2.00	Oil Movement B
Dies & Blanking (Cold Work)	AIRTEM Air Hardening		C 1.00, Mn .60, Cr 5.50, M 1.10, V .20	Air Mach. 70 Movement A
Dies & Tools	CONQUEROR Water Hardening	W1	C .75/1.10, Mn .25, Si .30	Water Mach. 100 Movement C
Hot Work Dies	FERNO Oil Hardening	H-12	C .37, Cr 5.00, W 1.25, Mo 1.30, V .40, Si 1.00, Mn .35	Oil Mach. 85 Movement A
Hot Work (High Temperature)	VOLCANO Air Hardening		C .40, Cr 2.00, W 12.00, V .35, S .30	Air Mach. 65 Movement A
Hollow Die Steel	LESCALLOY Oil Hardening		Special Analysis	
Machine Parts	CROMA ALLOY Water & Oil Hardening		Special Analysis	Water or Oil Mach. 90 Movement B
Punches & Dies	APEX DRILL RODS Water Hardening	C1	C 1.00	Water Mach. 100 Movement B
Shearing & Punching	ROCKET Water or Oil Hardening	S5	C .60, Mn .75, Si 1.55, Mo .50	Oil or Water Mach. 70 Movement B
Shock Resisting	LECO NON-TEMPERING.		Special Analysis	Water Mach. 80 Movement C

P. F. McDONALD & CO., 17 King Terminal, Boston 27, Mass. — Listing No. 40

Blacksmithing Tools	MACCO SOLID	W1	C .75-.85, Mn .15-.35, Si .15-.30	Water, Oil Movement ±B
Cold Work Dies (Blanking, Forming)	MACCO EXTRA	W1	C .95-1.10, Mn .15-.35, Si .10-.35	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	MACCO STANDARD	W1	C .95-1.10, Mn .15-.35, Si .10-.35	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Punching, Cold Forming)	MACCO KROMAX 1 Air Hardening	D2	C 1.50, Mn .35, Cr 11.90, Mo .90, V .28, Si .23	Air, Oil Mach. 60 Movement +A
Cold Work Dies (Blanking, Punching, Cold Forming)	MACCO KROMAX 2 Air Hardening	D5	C 1.40, Mn .32, Cr 12.50, Mo .85, Co 3.25, Si .42	Air Mach. 60 Movement +A
Cold Work Dies (Cold Heading)	MACCO B-29 Water Hardening	W2	C .98, Mn .28, V .20, Si .20	Water Mach. 100 Movement —B
Cold Work Punches, Dies (all kinds)	MACCO 35 AIR HARD	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.15, V .25, Si .25	Air Mach. 70 Movement +A
Cold Work Punches, Dies (all kinds)	MACCO ROYAL CROWN Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, V .25, Si .30	Oil Mach. 90 Movement +B
Cold Work Punches, Dies (all kinds)	MACCO SPECIAL Water Hardening	W1	C 1.01, Mn .20, Si .18	Water Mach. 100 Movement +C
Cutting Tools	MACCO ENORMOUS High Speed	T6	C .83, Mn .25, Cr 4.50, W 22.00, Mo 1.00, V 2.00, Co 10.00, Si .27	Oil Mach. 55 Movement ±A
Cutting Tools	MACCO RADIO High Speed	M2	C .84, Mn .25, Cr 4.00, W 6.50, Mo 5.00, V 1.90, Si .26	Oil Mach. 65 Movement ±A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools	MACCO SUPERIOR High Speed	T1	C .75, Mn .28, Cr 4.00, W 18.00, V 1.00, Si .22	Oil Mach. 60 Movement ±A
Cutting Tools	MACCO SUPER MOLY High Speed	M1	C .80, Mn .25, Cr 3.90, W 1.70, Mo 8.80, V 1.10, Si .24	Oil Mach. 55 Movement +A
Cutting Tools (Rough Drilling)	HOLLOW DRILL	W1	C .75-.85, Mn .15-.35, Si .15-.30	Water, Oil Movement ±B
Cutting Tools (Stone Drilling)	MACCO BROACHING AND CHANNELLER	W1	C .75-.85, Mn .15-.35, Si .15-.30	Water Movement +C
Diecasting Lens Molds	MACCO LENS MOULD High Speed		C .40, Mn .25, Cr 5.25, W 4.65, Si 1.00	Air, Oil Mach. 70 Movement +A
Diecasting (Magnesium, Aluminum)	MACCO 33 Air Hardening		C .40, Mn .30, Cr 5.50, Mo 1.40, V 1.00, Si 1.00	Air Mach. 70 Movement +A
Diecasting (Zinc)	MACCO 99 Oil Hardening		C .35, Mn .80, Cr .85, Mo .35, Si .60	Oil Mach. 70 Movement +A
Hot Work Dies	MACCO M L Air Hardening	H12	C .35, Mn .30, Cr 5.00, W 1.50, Mo 1.65, Si 1.00	Air Mach. 70 Movement +A
Hot Work Dies	MACCO M.L.V.	H12	C .35, Mn 1.05, Si 1.05, Cr 5.15, Mo 1.55, W 1.25, V .30	Air Mach. 70 Movement +A
Hot Work Dies	MACCO P-125 High Speed	H25	C .25, Mn .28, Cr 4.20, W 15.50, V .50, Si .27	Oil Mach. 65 Movement +A
Hot Work Dies	MACCO P-150 High Speed	H24	C .51, Mn .29, Cr 2.90, W 15.30, V .60, Si .25	Oil Mach. 65 Movement +A
Hot Work Dies	MACCO P-175 High Speed	H21	C .31, Mn .29, Cr 3.30, W 9.50, V .50, Si .43	Oil Mach. 65 Movement +A
Impact Tools, Chisels, Shear Blades	MACCO FOOLPROOF	S1	C .55, Mn .25, Cr 1.40, W 2.40, V .30, Si .25	Oil Mach. 65 Movement ±B
Plastic Molding Dies	MACCO HOBOMOLD "A"	P4	C .07, Mn .40, Si .25, Cr 4.50, Mo .45	Air Mach. 60 Movement +A
Plastic Molding Dies	MACCO HOBOMOLD "B"	P5	C .06, Mn .30, Si .20, Cr 2.00	Oil Mach. 50 Movement +B
Plastic Molding Dies (Hubs)	MACCO HARD TUF Oil Hardening	S5	C .60, Mn .70, Mo .45, V .25, Si 1.85	Oil Mach. 75 Movement +B
Plastic Molding Dies (Hubs)	MACCO HOBOMOLD "C" Water, Oil Hardening	P1	C .04, Mn .20, Si .16	Oil, Water Mach. 40 Movement +C
Press Brake Dies	MACCO BRAKEDIE		C .50, Mn .85, Si .25, Cr .95, Mo .20	Oil Mach. 100 Movement +B
Punching, Shearing	MACCO FOOL PROOF Oil Hardening	S1	C .55, Mn .25, Cr 1.40, W 2.40, V .30, Si .25	Oil Mach. 65 Movement ±B
Shock Resisting (Intermittent Impact, Chisels)	MACCO SIL. MANG. Oil Hardening	S4	C .63, Mn .78, Si 2.00	Oil Mach. 75 Movement B
Special Purpose (Shock Resisting)	MACCO NON. TEMP.		C .35, Mn .70, Si .45, Cr .80, Mo .30, Cu .30	Water, Oil Mach. 80 Movement +B
Special Purpose (Cutting Tools)	MACCO W.J.F.		C 1.40, Mn .25, Si .15, W 4.00, Cr .60, V .35	Water Mach. 70 Movement +C

McINNES STEEL CO., 441 E. Main St., Corry, Pa. — Listing No. 41

Brake Dies	McINNES FOLDER-DIE	(Special steel "Brake Die," furnished heat treated ready for use)

MARSHALL STEEL CO., 4740 S. Lawndale Ave., McCook, Ill. — Listing No. 42

Cold Work Dies	AIRCRAT	A2	C 1.00, Mn .50, Cr 5.00, Mo 1.00, V .25, Si .25	Air Mach. 65 Movement A
Cold Work Dies	OILCRAT	O1	C .95, Mn 1.20, W .50, Cr .50, Si .25, V .20	Oil Mach. 85 Movement +A
Cold Work Dies	WATERCRAT	W1	C 1.05, Mn .35, Si .20, Cr .50	Water Mach. 100 Movement —B

MERIDIAN STEEL CO., 1776 Broadway, New York 19, N. Y. — Listing No. 43

Cold Work Dies (Blanking)	MERIDIAN AIR DIE Air Hardening		C 1.00, Mn .75, Cr 4.90, Mo 1.15, V .25, Si .30	Air Mach. 100 Movement A
Cold Work Dies (Blanking)	MERIDIAN OIL DIE Oil Hardening		C .95, Mn 1.10, Cr .50, W .60, V .20, Si .30	Oil Mach. 90 Movement A
Cold Work Dies (Shock Resisting)	MER-TEN		C .40, Mn .85, Si .35, Cr 1.00, Ni 1.00, Mo .45	Oil Mach. 70 Movement C
Cutting Tools	MERIDIAN CARBIDE		C .70, Mn .25, Cr 4.50, W 18.50, Mo .70, V 1.50, Co 12.00, Si .25	Oil Mach. 90 Movement B
Hot Work Dies	MERIDIAN H DIE Oil or Air Hardening		C .50, Mn .25, Cr 3.00, W 15.00, V .50, S .25	Oil or Air Mach. 90 Movement B
Punching & Shearing	MERICO #2		C .40, Mn .45, Si .70, Cr .75, Mo .55, Cu .65	Oil Mach. 65 Movement C
Shock Resisting	MERICO #1		C .35, Mn .40, Si .75, Cr .70, Mo .65, Cu .70	Water Mach. 60 Movement C

METAL CARBIDES CORP., 107 E. Indianola Ave., Youngstown 7, O. — Listing No. 44

Cold Work Dies (Blanking) TALIDE C-75, Carbide	W 65.72, Ta 4.69, C 4.59, Co 25.0
Cold Work Dies (Cold Forming) TALIDE C-88, Carbide	W 84.49, C 5.51, Co 10.0
Cutting Tools (Roughing, Steel) TALIDE S-88, Carbide	W 69.47, Ti 9.60, Ta 5.63, C 7.30, Co 8.0

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Cutting Tools (Finishing, Steel)	TALIDE S-90, Carbide		W 89.00, Ti 10.00, Ta 6.10, C 7.40, Co 7.5	
Cutting Tools (Light Finishing, Steel)	TALIDE S-92, Carbide		W 89.47, Ti 11.20, Ta 6.56, C 7.77, Co 5.0	
Cutting Tools (Precision Boring, Steel)	TALIDE S-94, Carbide		W 89.00, Ti 11.60, Ta 7.03, C 7.87, Co 4.5	
Cutting Tools (Roughing, Cast Iron)	TALIDE C-89, Carbide		W 85.90, Ta 2.34, C 5.76, Co 6.0	
Cutting Tools (Finishing, Cast Iron)	TALIDE C-91, Carbide		W 87.31, Ta .94, C 5.75, Co 6.0	
Cutting Tools (Light Finishing, Cast Iron)	TALIDE C-93, Carbide		W 89.19, Ta .94, C 5.87, Co 4.0	
Cutting Tools (Precision Boring, Cast Iron)	TALIDE C-95, Carbide		W 89.66, Ta .94, C 5.90, Co 3.5	
Punching, Shearing	TALIDE C-80, Carbide		W 77.92, C 5.08, Co 17.0	
Shock Resisting (Intermittent Impact)	TALIDE C-85, Carbide		W 81.68, C 5.32, Co 13.0	
Shock Resisting (Repeated Impact)	TALIDE C-80, Carbide		W 77.92, C 5.08, Co 17.0	

A. MILNE & CO., 741-3-5 Washington St., New York 14, N. Y. — Listing No. 45

Cold Drawing Dies	GRAPH-TUNG‡ Water Hardening	WW	C 1.50, Mn .40 Max, W 2.80 Avg., Mo .50, Si .60-.70	Water Mach. 100 Movement C
Cold Drawing Dies	GRAPH-MO‡ Oil Hardening	O6	C 1.50, Mn 1.00 Max, Mo .25 Avg., Si .80 Avg.	Oil Mach. 160 Movement A
Cold Drawing Dies	HIGH PRODUCTION Air Hardening	D2	C 1.55, Cr 11.50, Mo .75, V 1.00	Air, Oil Mach. 80 Movement +A
Cold Heading Dies (Also Nonferrous Cold Drawing Dies)	GRAPH-AL‡ Water Hardening	WA1	C 1.50, Mn .30 Max, Si .15-.25, Ni Al .12-.20	Water Mach. 160 Movement C
Cold Work Dies (Blanking, Forming)	AMC Oil, Air Hardening, High Speed	T1	Cr 4.00, W 18.00, V 1.00	Oil, Hot Salt, Air Mach. Movement +A 55
Cold Work Dies (Blanking, Forming)	AMCOH Standard Oil Hardening	O1	C .95, Mn 1.25, Cr .50, W .50	Oil Mach. 80 Movement A
Cold Work Dies (Blanking, Forming)	DOUBLE SEVEN Air Hardening	D5	C 1.35, Cr 12.50, Mo .60, Co 3.00	Air, Oil Mach. 45 Movement +A
Cold Work Dies (Blanking, Forming)	DOUBLE SIX Air Hardening	D3	C 2.25, Cr 13.00	Oil, Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Forming)	ORANGE LABEL Water Hardening	W1	C 1.00-1.10	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Forming)	(See GRAPH-TUNG, GRAPH-MO, HIGH PRODUCTION, Listed Above)			
Cutting Tools (Finishing)	(See AMC Listed Above)			
Cutting Tools (Finishing)	MMV Oil, Air Hardening, High Speed	M3	C 1.15, W 6.40, Mo 5.00, V 1.90	Oil, Hot Salt, Air Mach. Movement +A 60
Cutting Tools (Finishing)	MM6&6 Oil, Air Hardening, High Speed	M1	C .85, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Hot Salt Mach. 60 Movement +A
Cutting Tools (Roughing)	MMCO Oil, Air Hardening, High Speed	M36	W 5.80, M 5.20, Cr 4.00, V 2.00, Co 9.00	Oil, Hot Salt, Air Mach. Movement +A 50
Cutting Tools (Roughing)	MAJOR Oil, Air Hardening, High Speed	T5	Cr 4.00-5.00, W 21.00-22.00, Mo .50, V 1.50, Co 13.00	Oil, Hot Salt, Air Mach. Movement +A 45
Cutting Tools (Roughing)	(See AMC, MMV, MM6&6, Listed Above)			
Diecasting Dies	AO20 Water, Oil Hardening	S1	C .50, Cr 1.50, W 2.25, V .25	Oil, Water Mach. 70 Movement B
Diecasting Dies	CMV Air Hardening	H13	C .38, Cr 5.25, Mo 1.25 V 1.05, Si 1.00	Air, Oil Mach. 80 Movement +A
Diecasting Dies	CMW Air Hardening	H12	C .35, Cr 5.00, W 1.30, Mo 1.75, Si 1.00	Oil, Air Mach. 80 Movement +A
Gages	(See AMCOH, GRAPH-MO, GRAPH-TUNG, HIGH PRODUCTION, Listed Above)			
High Stress, High Wear, Machinery Parts	(See GRAPH-MO, GRAPH-TUNG, MSM, Listed Above)			
Hot Work Dies (Hot Forming)	(See AMC, AO20, CMW, Listed Above)			
Hot Work Dies (Hot Forming)	3074 HOT WORK Oil, Air Hardening	H21	C .35, Cr 4.00, W 8.00-10.00, V .50	Oil, Air Mach. 55 Movement A
Hot Work Dies (Hot Punching, Hot Shearing)	(See AMC, AO20, CMW, 3074 HOT WORK, Listed Above)			
Plastic Molding Dies (Ejector Pins)	MSM Water, Oil Hardening	S5	C .55, Mn .80, Mo .50, V .25, Si 2.00	Oil, Water Mach. 80 Movement B
Plastic Molding Dies (Ejector Pins)	(See AO20 Listed Above)			
Plastic Molding Master Hubs	(See AO20 Listed Above)			
Plastic Molding Dies (Hubs)	(See AMCOH, AO20, GRAPH-MO, HIGH PRODUCTION, MSM, Listed Above)			
Plastic Molding Dies (Machine Cavities)	(See AMCOH, GRAPH-MO, Listed Above)			
Punching and Shearing	MILTUFF Air, Oil Hardening		C .50, Cr 3.25, Mo 1.40, Mn .70	Air, Oil Mach. 95 Movement A
Punching and Shearing	(See AMCOH, DOUBLE SEVEN, GRAPH-MO, HIGH PRODUCTION, MSM, ORANGE LABEL, Listed Above)			
Shock Resisting (Repeated, Intermittent Impact)	(See AO20, MILTUFF, GRAPH-AL, GRAPH-TUNG, MSM, ORANGE LABEL, Listed Above)			

‡ Made by Timken Roller Bearing Co.

NEWCOMER PRODUCTS INC., P. O. Box 272, Latrobe, Pa. — Listing No. 46

Cutting Tools (High Speed Finishing, Cast Iron, Nonferrous) ..... NC-2, Carbide
Cutting Tools (General Machining, Cast Iron, Nonferrous) ..... NC-3, Carbide
Cutting Tools (Roughing Cuts, Cast Iron, Nonferrous) ..... NC-4, Carbide
Cutting Tools (Heavy Roughing, Cast Iron, Nonferrous) ..... NC-5, Carbide
Cutting Tools (Precision Finishing, Boring, Hard Steels) ..... NS-17, Carbide
Cutting Tools (General Machining, Average Roughing & Finishing of Steels) ..... NS-2, Carbide
Cutting Tools (Milling, General Machining of Steels) ..... NS-3, Carbide
Cutting Tools (Rough Turning of Forgings, Rolled, Abrasive Steels) ..... NS-4, Carbide
Cutting Tools (Heavy Interrupted Roughing of Steels) ..... NS-65, Carbide
Cutting Tools (Slow Speed, Heavy Feed Roughing of Steels) ..... NS-6, Carbide

NORTH AMERICAN STEEL CO., 4531 Hough Ave., Cleveland 3, O. — Listing No. 47

Brake Dies	SHEFFIELD P. B.		Oil Movement B
Bushings (Cutting Dies)	DEXITE TUBING		Oil Movement A
Cold Work Dies	DEXITE #14		Oil Movement A
Dies	DEXITE AH		Air Movement A
Dies	DEXITE FLAT GROUND STOCK		Oil, Air Movement A

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium, ★ % Machinability Annealed Movement in Hardening.
Hand Tools	NASCO			Water Movement B
High Tensile Shafting	SHEFFIELD #20			
Machined Parts	DEX-TUNG			Water Movement B
Pneumatic Tools	NASCOLOY			Oil, Water Movement B

PENINSULAR STEEL CO., 24401 Groesbeck Highway, P. O. Box 3853, Park Grove Sta., Detroit 5, Mich. — Listing No. 48

Coining, Swaging Dies	BROWN LABEL Oil Hardening	S1	C .47-.53, Mn .15-.25, Cr 1.10-1.30, W 2.25-2.75, V .15-.25, Si .65-.85	Oil Mach. 80 Movement + B
Cold Work Dies (Forming)	GREEN LABEL Oil Hardening		C .50-.55, Mn .70-.90, Cr .90-1.10, V .15-.25	Oil Mach. 100 Movement + B
Cold Work Dies (Blanking, Forming)	BLACK LABEL Water Hardening	W4	C 1.05-1.15, Cr .50-.60, V .15-.25	Water Mach. 95 Movement —C
Cold Work Dies (Blanking, Forming)	BLUE LABEL Water Hardening	W2	C 1.00-1.10, V .15-.25	Water Mach. 100 Movement —C
Cold Work Dies (Blanking, Forming, etc.)	GRAPH-MO Oil Hardening	O6	C 1.50, Avg., Mn .50 Max., Mo .25 Avg., Si .80 Avg.	Oil Mach. 100 Movement A
Cold Work Dies (Bar, Tube Drawing, Draw Dies, Stainless)	GRAPH-TUNG Water Hardening		C 1.50 Avg., Mn .50 Max., W 2.80 Avg., Mo .50 Avg., Si .65 Avg.	Water, Brine Mach. 85 Movement B
Cold Work Dies (Blanking, Cold Forming)	PEN AIR #5 Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25	Air Mach. 65 Movement + A
Cold Work Dies (Blanking, Forming, Coining, Punching, Rolling)	WHITE LABEL Oil, Air Hardening	D2	C 1.40-1.60, Cr 11.00-13.00, Mo .70-.90, V .30-.40	Air Mach. 75 Movement + A
Cold Work Dies (Forming, Rolling, Blanking)	YELLOW LABEL Oil Hardening	O1	C .85-.95, Mn 1.10-1.25, Cr .40-.60, W .40-.60, V .15-.25, Si .20-.40	Oil Mach. 85 Movement + B
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR (Yellow Label) Oil Hardening	O1	C .90, Mn 1.20, V .20, Cr .50, W .50	Oil Mach. 90 Movement + B
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR (Graph Mo)	O6	C 1.50, Mn 1.00, Mo .50, Si .125	Oil Mach. 100 Movement + A
Cold Work Dies (Forming, Draw Rings)	HOLLOBAR (White Label) Air Hardening	D2	C 1.55, Cr 11.50, Mo .80, V .40	Air Mach. 50 Movement + A
Cold Work Dies (Press Brake Forming)	PENCO BD-30		C .51, Mn .87, Cr .95, Mo .20	Mach. 80
Cut Off Bushing	GRAPH-TUNG (Listed Above)			
Dies (Bars, Tube Drawing, etc.)	GRAPH-AL Water Hardening		C 1.50 Avg., Mn .30 Max., Si .15-.25, Al .12-.20	Water, Brine Mach. 100 Movement B
Dies (Blanking, Cold Forming, etc.)	GRAPH M.N.S. Air Hardening		C 1.50 Avg., Mn 1.25 Avg., Cr .50 Avg., Mo .50 Avg., Si 1.00 Avg.	Air Mach. 85 Movement A
Diecasting Dies	PENCO HI-VAN Air Hardening	H13	C .38, Cr 5.25, Mo 1.25, V 1.05	Air Mach. 70 Movement + A
Diecasting Dies	CR-MO-W	H12	C .35, Cr 5.15, W 1.55, Mo 1.65, Si 1.05	Air Mach. 70 Movement + A
Hobbed Cavities	O.C.S.	P5	C .06 Max., Mn .30, Cr .95, B added, Mo .25	Oil Mach. 50 Movement B
Hot Work Dies	(See CR-MO-W & PENCO HIVAN Listed Above)			
Lathe Centers	GRAPH-TUNG (Listed Above)			
Master Gages, Hobs	WHITE LABEL (Listed Above)			
Plastic Mold Dies (Hubbed Cavity Dies)	PENCO ACS Air Hardening	P4	C .07, Mn .40, Si .25, Cr 4.50	Oil, Air Mach. 65 Movement + A
Plastic Mold Master Hobs	BROWN LABEL (Listed Above)			
Plastic Molds (Machined Cavities)	GREEN LABEL (Listed Above)			
Plastic Molds (Hubs)	YELLOW LABEL (Listed Above)			
Punches (Blanking, Forming, Piercing, etc.)	GRAPH-MO (Listed Above)			
Punching, Shearing	SILVER LABEL Water, Oil Hardening	S5	C .55-.60, Mn .65-.80, Mo .40-.50, V .16-.25, Si 1.70-2.00	Water, Oil Mach. 100 Movement + B
Punching, Shearing	(See BLACK LABEL, BLUE LABEL, WHITE LABEL Listed Above)			
Shock Resisting	BROWN LABEL (Listed Above)			
Shock Resisting (Tool Shanks)	SILVER LABEL (Listed Above)			
Shock Resisting Tools (Repeated Impact)	AIR-SHOCK Air Hardening		C .50, Mn .70, Cr 3.25, Mo 1.40	Air Mach. 90 Movement + A
Tool Shanks, Wrenches	GREEN LABEL (Listed Above)			
Tube Drawing Mandrels	GRAPH-AL (Listed Above)			

PENNSYLVANIA STEEL CORP., 12270 Coyle Ave., Detroit 27, Mich. — Listing No. 49

Blanking, Forming	L. T. A. Air Hardening		C 1.00, Mn 2.00, Cr .90, Mo .90	Air Movement A
Cold Work (Dies, etc.)	DYCRO Air Hardening	D2	C 1.55, Cr 11.50, Va .25, Mo .75	Air Movement A
Cold Work (Dies, etc.)	PENN AIR Air Hardening	A2	C 1.00, Mn .45, Si .40, Cr 5.15, Va .40, Mo 1.10	Air Movement A
Cold Work (Punches, etc.)	BULL DOG Oil Hardening	S1	C .50, Cr 1.20, Va .25, W 2.50	Oil, Water Movement B
Cutting Tools	PENN-CUT 18-4-1—HSS	T1	C .73, Cr 4.00, Va 1.00, W 18.00	Air, Oil Movement A-B
Cutting Tools	PENN-CUT-MOLY 6-6-2—HSS	M2	C .83, Cr 4.15, Va 1.90, W 6.40, Mo 5.00	Air, Oil Movement A-B
Cutting Tools	PENN-CUT-5 18-4-1-5—HSS	T4	C .73, Cr 4.00, Va 1.00, Mo .50, W 18.00, Co 5.00	Air, Oil Movement A-B
Hot Work	NITUNO Hot Work		C .30, Cr 2.75, Mo .30, W 9.50, Ni 1.60	Air, Oil Movement A-B
Hot Work	P. H. VAN Air Hardening	H13	C .40, Si 1.10, Cr 5.25, Va 1.00, Mo 1.25	Air Movement A-B
Hot Work	P.H.W. Air Hardening	H12	C .35, Si 1.00, Mo 1.50, Cr 5.00, W 1.25	Air, Oil Movement A
Hot Work	P.H. 9 Hot Work	H21	C .35, Cr 2.75, Va .30, W 9.00	Air, Oil Movement A-B
Hot Work	P.H. 14		C .42, Cr 3.50, Va .30, W 14.00	Air, Oil Movement A-B

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Punching, Shearing	SHEAR CUT Water, Oil Hardening	S5	C .55, Mn .85, Si 2.00, Cr .25, Va .30	Oil, Water Movement B
Special Purpose Machine Parts	FLEXOR Special Alloy		C .34, Mn-Cr-Si-Mo-W-Special	Oil Movement A
Tools (Dies, etc.)	TEMPO Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50	Oil Movement A

HORACE T. POTTS CO., E. Erie Ave. & D St., Philadelphia 34, Pa. — Listing No. 50

Die Casting Dies	ELASTUF 44		C .50, Bal. Cr, Ni, Mo, Fe	Commercially Machinable
High Stress, High Wear Machinery Parts	ELASTUF TYPE A2		C .30-.50, Bal. Cr, Ni, Mo, Fe	Commercially Machinable
High Stress, High Wear Machinery Parts	(See ELASTUF 44 Listed Above)			
Plastic Molding Dies (Ejector Pins)	(See ELASTUF 44 Listed Above)			
Short Run Punches and Dies	(See ELASTUF 44, ELASTUF TYPE A2 Listed Above)			

PYRAMID STEEL CO., P. O. Box 1226, Cleveland 3, O. — Listing No. 51

Abrasive Plates	MANGO PLATE			Water
Brake Dies	CHROMODI			Oil Movement B
Dies (All Types)	PYR-OH-DIE			Oil Movement A
Dies (All Types)	PYR-AH-DIE			Air Movement A
Hi-Stress Non Wear Machine Parts	MAINTENAL			Oil Movement A
Hi-Stress Shafting Heat Treated	SILVALOY			
Hi-Stress Studs Heat Treated	MAINTENAL STUD STOCK			
Shock Resisting Tools	NU-PYR-LOY			Oil Movement B
Shock Resisting Hand Tools	SU-PYR-LOY			Water Movement A
All Purpose Tool Room	TUNGSITE			Oil & Water Movement B

REPUBLIC STEEL CORP., 3100 E. 45th St., Cleveland 27, O. — Listing No. 52

Cold Work (Forming)	C-C Water Hardening	W5	C 1.10, Mn .30, Cr .60	Water Mach. 85 Movement —B
Cold Work (Forming)	UA-8 Water Hardening	L7	C 1.00, Mn .35, Cr 1.35, Mo .35	Water, Oil Mach. 80 Movement B
Cold Work (Hubs)	C-V Oil Hardening	S1	C .50, Mn .30, Cr 1.20, W 2.20, V .25	Water, Oil Mach. 85 Movement +B
Cold Work (Punching, Shearing, Forming)	DUMOST #1 Water Hardening	W2	C .85, Mn .30, V .30	Water Mach. 90 Movement —B
Cold Work (Punching, Shearing, Forming)	DUMOST #2 Water Hardening	W2	C .95, Mn .30, V .30	Water Mach. 90 Movement —B
Cold Work (Punching, Shearing, Forming)	EXTRA CARBON Water Hardening	W1	C .65-1.40, Mn .30, Si .15-.30	Water Mach. 100 Movement —B
Cold Work (Punching, Shearing, Forming)	SPECIAL CARBON Water Hardening	W1	C .65-1.40, Mn .30, Si .15-.30	Water Mach. 100 Movement —B
Cold Work (Punching, Shearing, Forming)	STANDARD CARBON Water Hardening	W1	C .65-1.00, Mn .30, Si .15-.30	Water Mach. 100 Movement —B
Cold Work (Forming, Shearing)	UA-6 Oil Hardening		C .65, Mn .60, Cr 1.00, W .25, V .25	Oil, Water Mach. 75 Movement —B
Cold Work Dies (Blanking, Forming)	DUMOST #3 Water Hardening	W2	C 1.10, Mn .30, V .30	Water Mach. 85 Movement —B
Cold Work Dies (Blanking, Forming, Shearing)	AIRALOY Air Hardening	A4	C 1.00, Mn 2.00, Cr .90, Mo .90	Air Mach. 65 Movement +A
Cold Work Dies (Blanking, Forming, Shearing)	ARRESTITE Oil Hardening	O2	C .90, Mn 1.50, Cr .20	Oil Mach. 90 Movement A
Cold Work Dies (Blanking, Forming, Shearing)	KROMAIR	A2	C 1.00, Cr 5.25, Mo 1.15, V .25	Air Movement A
Cold Work Dies (Blanking, Forming, Shearing)	SPECIAL OIL HARDENING Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Forming, Shearing)	404 Air Hardening	D2	C 1.55, Cr 12.00, Mo .75, V .25	Air, Oil Mach. 50 Movement +A
Cutting Tools (Finishing)	FAST FINISHING Water Hardening	F2	C 1.35, W 3.50	Water Mach. 65 Movement —C
Cutting Tools (Roughing)	B-F HIGH SPEED High Speed	T1	C .72, Mn .30, Cr 4.00, W 18.00, V 1.00	Oil, Air Mach. 80 Movement +A
Cutting Tools (Roughing)	COBALT HIGH SPEED High Speed	T4	C .72, Mn .30, Cr 4.00, W 18.00, Mo .50, V 1.00, Co 5.00	Oil, Air Mach. 45 Movement +A
Cutting Tools (Roughing)	SPECIAL M-O High Speed	M2	C .82, Mn .30, Cr 4.15, W 6.40, Mo 5.00, V 1.90	Oil, Air Mach. 85 Movement +A
Cutting Tools (Roughing, Finishing)	IXL High Speed	T2	C .80, Mn .30, Cr 4.00, W 19.00, Mo .75, V 2.00	Oil, Air Mach. 45 Movement +A
Diecasting Dies (Brass)	RESCO Air Hardening		C .30, Cr 2.75, W 9.50, Mo .25, Ni 1.75	Air, Oil Mach. 70 Movement +B
Diecasting Dies (Aluminum)	V-HW Air Hardening	H13	C .40, Cr 5.00, Mo 1.25, V 1.00, Si 1.00	Air Movement A
Hot Work (Forming, Shearing)	6-H-W Air Hardening		C .60, Cr 4.00, Mo .45, V .75	Air, Oil Mach. 75 Movement +B
Hot Work Dies (Forming, Punching)	10-H-W Air Hardening	H12	C .35, Cr 5.00, W 1.25, Mo 1.50, Si 1.00, V .35	Air, Oil Mach. 70 Movement B
Hot Work (Hot Forming)	XX-SUPERIOR Air Hardening		C .90, Cr 4.00, Mo .45, V .75	Air, Oil Mach. 75 Movement +B
Hot Work (Punching, Forming)	AIR HARDENING #30 Air Hardening	H21	C .30, Cr 3.50, W 9.00, V .50	Air, Oil Mach. 70 Movement +B
Hot Work (Punching, Shearing, Forming)	AIR HARDENING #40 Air Hardening	H24	C .50, Cr 3.00, W 15.00, V .50	Air, Oil Mach. 65 Movement —B
Hot Work (Punches, Dies)	(See C-V Listed Above)			
Hot Work (Punching, Forming)	(See RESCO Listed Above)			
Hot Work (Punching, Forming)	550 Oil Hardening		C .45, Mn .65, Cr 1.00, Mo 1.10, V .25	Oil Mach. 80 Movement +B

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Plastic Mold Dies (Hubbed Cavities)	PLASTIC DIE Water Hardening	P1	C .08 Max., Mn .10 Max.	
Shock Resisting (Intermittent Impact)	UA-4 Oil Hardening		C .50, Mn .60, Cr 1.00, W .25, V .25	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	M-TUNGSTEN Oil Hardening	S3	C .50, Mn .35, Cr 1.00, W 1.00	Oil, Water Mach. 80 Movement B
Shock Resisting (Repeated Impact)	SPECIAL AUTO-A Oil Hardening		C .30, Mn .65, Cr .90, V .20	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	SPECIAL AUTO-D Oil Hardening		C .50, Mn .65, Cr .90, V .20	Oil, Water Mach. 80
Shock Resisting (Repeated Impact)	SPECIAL PUNCH Water Hardening	S4	C .55, Mn .85, Cr .30, V .30, Si 2.00	Water, Oil Mach. 80 Movement —B

JOS. T. RYERSON & SON INC., P. O. Box 8000-A, Chicago 80, Ill. — Listing No. 53

Chisels—Drills	V.D. CHISEL STEEL Water Hardening		C .77, Mn .35, Mo .18, Si .23	Water
Cold Work Dies (Blanking & Forming)	RY-ALLOY Oil Hardening	O2	C .95, Mn 1.60, Mo .25, Si .25	Oil Mach. 90 Movement A
Cold Work Dies (Blanking & Forming)	RY-ALLOY FLAT Ground Stock	O2	C .95, Mn 1.60, Mo .25, Si .25	Oil Mach. 90 Movement A
Cold Work Dies (Blanking & Forming)	V.D. Water Hardening	W2	C 1.00, Mn .23, V .18, Si .25	Water Mach. 95 Movement C
Cutting Tools	(See V.D., RY-ALLOY Listed Above)			
Diecasting Dies	NITRALLOY 135 MOD. Heat Treated		C .40, Mn .60, Mo .35, Cr 1.70, Al 1.20, Si .35	Mach. 125
Gages	(See V.D., RY-ALLOY, RY-ALLOY FLAT Listed Above)			
High Stress, High Wear Machinery Parts	NEW RYCUT 50 Heat Treated		C .50, Bal. Cr, Mo, Fe, Leaded	Mach. Annld. 215 H.T. 165
High Stress, High Wear Machinery Parts	RYCROME Heat Treated		C .40, Bal. Cr, Mo, Fe	Mach. H.T. 137
High Stress, High Wear Machinery Parts	RYCUT 40 Heat Treated		C .40, Bal. Cr, Mo, Fe, Leaded	Mach. Annld. 225 H.T. 185
High Wear Machinery Parts	RYCUT 20		C .20, Bal. Ni, Cr, Mo, Fe, Leaded	Mach. 225
High Stress, High Wear Machinery Parts	(See NITRALLOY 135 MOD. Listed Above)			
Plastic Forming Dies	RY-ALLOY	(Listed Above)		
Plastic Molding Dies (Ejector Pins)	RY-ALLOY DRILL Rod	O2	C .95, Mn 1.60, Mo .25, Si .25	Oil Mach. 90 Movement A
Plastic Molding Dies (Ejector Pins)	RYERSON CARBON Drill Rod		C 1.00	Water Mach. 100 Movement B
Press Brake Dies	RYCUT 50 Heat Treated		C .50, Bal. Cr, Mo, S, Fe	Mach. Annld. 175 H.T. 150
Punching & Shearing	(See V.D., RY-ALLOY Listed Above)			

SANDVIK STEEL INC., 1702 Nevins Rd., Fair Lawn, N. J. — Listing No. 54

Cutting Tools (Finishing) — Low Cobalt Content Tungsten, Titanium Carbide — F1, Carbide
Cutting Tools (Finishing) — Low Cobalt Content Tungsten, Carbide — H2, Carbide
Cutting Tools (Finishing & Roughing) — Low Cobalt Content Tungsten, Carbide — H1, Carbide
Cutting Tools (Finishing & Roughing) — Low Cobalt Content Tungsten, Titanium Carbide — S1, Carbide
Cutting Tools (Roughing) — Medium Cobalt Content Tungsten, Tantalum Carbide — S4, Carbide
Cutting Tools (Roughing) — High Cobalt Content Tungsten, Tantalum Carbide — S6, Carbide
Cutting Tools (General Purpose) — Low Cobalt Content Tungsten, Tantalum Carbide — SH, Carbide
Cutting Tools (General Purpose) — Medium Cobalt Content Tungsten, Titanium Carbide — S2, Carbide
Cutters (Milling) — (See S1, S4, S6, H1 Listed Above)
Cutters (End Mills, Step) — (See S1, S4, H1 Listed Above)
Dies (Wire & Tube-Drawing, Deep Drawing, Light Heading and Blanking) — Cobalt Tungsten Carbide
Drills (For Cast Iron & Steel) — (See H1 Listed Above)
Scrapers — (See H1, H2 Listed Above)

SEABOARD STEEL CO. OF AMERICA INC., 1775 Broadway, New York 19, N. Y. — Listing No. 55

Cold Work (Blanking)	SECOLEO		C .95, Mn 1.20, Cr .55, W .50	Oil Movement A
Cold Work (Blanking)	SECAERO		C 1.10, Mn .80, Cr 5.50, Mo 1.20, V .30, Si .40	Air Movement A
Cutting Tools (Roughing)	SECOBALT (High Speed)		C .70, Mn .30, Cr 4.75, W 18.50, Mo .70, V 1.50, Co 12.00, Si .30	Movement B
Cutting Tools (Finishing)	SECOVAN (High Speed)		C .85, Mn .30, Cr 4.25, W 18.50, Mo .70, V 2.20, Si .30	Movement B
High Tensile Alloy Steel (Torsional Strains and Stresses)	SEABOARD SPECIAL RED LABEL		C .50, Mn 1.10, Si .25, Cr 1.40, Mo .80, Ni .87, P & S .10	
Punching & Shearing (Shock Resisting)	PROGEN		C .37, Mn .50, Cr .80, Mo .80, Cu .70, Sil .70	

SIMONDS SAW & STEEL CO., Ohio St., Lockport, N. Y. — Listing No. 56

Cold Work Dies	C.C.M. Air Hardening	D2	C 1.55, Mn .25, Cr 12.00, Mo .80, V .25, Si .35	Air Movement A
Cold Work Dies	SIMONDS AIRTRUE Air Hardening	A2	C 1.00, Mn .65, Si .25, Cr 5.25, Mo 1.00, Va .30	Air
Cold Work Dies	SIMONDS 864 Oil Hardening	O2	C .90, Mn 1.50, Mo .25	Oil Movement A
Cold Work Dies	S-12225 Oil Hardening	D3	C 2.00, Mn .35, Si .50, Cr 12.00	Oil Movement A
Cold Work Dies	TEENAX No. 46 Oil Hardening	O1	C .90, Mn 1.25, Cr .50, W .50, V .20, Si .20	Oil Movement A
Cutting Tools	BLUE LABEL Water Hardening	W1	C as desired, P .02 max., S .02 max, V optional	Water
Cutting Tools	DIAMOND S Water Hardening	W1	C as desired, P .025 max., S .025 max, V optional	Water

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. * % Machinability Annealed Movement in Hardening.
Cutting Tools	LOCKPORT SPECIAL High Speed	T2	C .80, Cr 4.25, W 18.50, Mo .70, V 2.25	
Cutting Tools	MOLVA-T High Speed	M2	C .80, Cr 4.00, W 5.75, Mo 4.50, V 1.60	
Cutting Tools	RED STREAK High Speed	T1	C .72, Cr 4.00, W 18.00, V 1.00	
Cutting Tools	S.T.M. High Speed	M1	C .80, Cr 3.75, W 1.50, Mo 8.75, V 1.25	
Cutting Tools	SUPER COBALT High Speed	T5	C .80, Cr 4.00, W 18.00, V 2.00, Co 8.00	
Cutting Tools	TUNCO High Speed	T4	C .75, Cr 4.00, W 18.00, V 1.00, Co 5.00	
Hot Work Dies	CHROME HOT DIE Air Hardening		C 1.00, Mn .30, Cr 4.00, Si .30	Air
Hot Work Dies	D.N.V. Hot Work Oil, Air Hardening	H21	C .32, Mn .30, Cr 3.25, W 9.50, V .40, Si .35	Air, Oil
Shock Resisting	COMMANDO 47 Oil Hardening	S1	C .47, Mn .25, Cr 1.40, W 2.00, Mo .25, V .25, Si .80	Oil
Shock Resisting	HAVOC Water, Oil Hardening	S2	C .50, Mn .40, Mo .50, V .20, Si 1.00	Water
Shock Resisting	ORLEANS Water, Oil Hardening	S5	C .53, Mn .80, Cr .25, Mo .35, V .20, Si 1.95	Oil, Water Movement —C

TIMKEN ROLLER BEARING CO., 1835 Dueber Ave. S. W., Canton 6, O. — Listing No. 57

Bushings (Drill Jig and Die Set, High Wear Resistance)	GRAPH-MO Oil Hardening	O6	C 1.45 avg., Mn 1.00 max., Mo .25 avg., Si .90 avg.	Oil Mach. 100 Movement A
Cold Work Dies	(See GRAPH-MO Listed Above)			
(Gibs, Wear Plates, Straightener & Leveller Rolls, Stainless Strip Forming Rolls, Flanging Sections, Commercial Piston Rings, Master & Machine Cams, Wear-Resistant Die Inserts, Machine Tool Parts, Brick Mold Liners and Platen Plates)				
Cold Work Dies (Bar, Tube Drawing, Draw Dies, Stainless)	GRAPH-TUNG Water Hardening		C 1.50 avg., Mn .50 max., W 2.80 avg., Mo .50 avg., Si .65 avg.	Water or Brine Mach. Movement B 85
Cut Off Bushing	(See GRAPH TUNG Listed Above)			
Dies (Bar, Tube Drawing, etc.)	GRAPH-AL Water Hardening		C 1.50 avg., Mn .30 max., Si .15-.25, Al .12-.20	Water or Brine Mach. Movement B 100
Dies (Blanking, Cold Forming, etc.)	GRAPH M.N.S.		C 1.50 avg., Mn 1.25 avg., Cr .50 avg., Mo .50 avg., Si 1.00 avg., Ni 1.75 avg.	Air Mach. 85 Movement A
Draw Dies (Deep Draw, Carbon and Stainless)	(See GRAPH-MO Listed Above)			
Gages (Master, Thread, Ring & Plug, Gage Blocks, and Surface Plates)	(See GRAPH-MO Listed Above)			
General Purpose (Standard Tool Room Oil Hardening)	(See GRAPH-MO Listed Above)			
Lathe Centers	(See GRAPH-TUNG Listed Above)			
Punches (Blanking, Forming, Piercing, etc.)	(See GRAPH-MO Listed Above)			
Tube Drawing Mandrels	(See GRAPH-AL Listed Above)			

TUNGSTEN ALLOY MFG. CO. INC., 65 Colden St., Newark 1, N. J. — Listing No. 58

Cutting Tools (Chip Removal, Cast Iron, Nonferrous, Roughing)	9, Carbide		Cutting Tools (Chip Removal, Steel, Finishing)	8T, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous, General Purpose)	9-H, Carbide		Cutting Tools (Chip Removal, Steel, Precision Boring)	8S, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous, Light Finishing)	9-C, Carbide		Impact Application (Light)	9-A15, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous, Precision Boring)	9-B, Carbide		Impact Application (Medium)	9-A20, 20H, Carbide
Cutting Tools (Chip Removal, Steel, Roughing)	11T, Carbide		Impact Application (Heavy)	9-A25, 25H, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose)	10T, Carbide		Wear Application (Wear Surface, No Shock)	9, Carbide
			Wear Application (Wear Surface, Light Shock)	9-M, Carbide
			Wear Application (Wear Surface, Heavy Shock)	9-A, Carbide

UDDEHOLM CO. OF AMERICA INC., 155 E. 44th St., New York 17, N. Y. — Listing No. 59

Cold Work Dies (Blanking, Cold Forming)	UHB Water Hardening	W1	C 1.05, Mn .30, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Cold Forming)	UHB EXTRA Water Hardening	W1	C 1.05, Mn .30, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Cold Forming)	UHB-VA Water Hardening	W2	C 1.05, Mn .30, Si .25, V .20	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Cold Forming, Coining, Swaging)	UHB-711 Oil Hardening	S1	C .50, Mn .25, Si .75, Cr 1.25, W 2.50, V .20	Oil Mach. 75 Movement +B
Cold Work Dies (Blanking, Stamping, Cold Forming)	UHB-46 Oil Hardening	O1	C .90, Mn 1.20, Si .35, Cr .50, W .50, V .15	Oil Mach. 90 Movement +A
Cold Work Dies (Blanking, Stamping, Trimming, Cold Forming)	UHB-151 Air Hardening	A2	C 1.00, Mn .60, Si .25, Cr 5.25, Mo 1.10, V .20	Air Mach. 65 Movement +A
Cold Work Dies (Blanking, Stamping, Lamination, Extruding, Thread and Form Rolling, Cold Forming, Powder Compression)	TRIMO Air Hardening	D2	C 1.50, Mn .30, Si .40, Cr 12.00, Mo .80, V .25	Air Mach. 45 Movement +A
Cold Work Dies (Blanking, Stamping, Lamination, Extruding, Cold Forming, Powder Compression)	TRIVAN Oil Hardening	D3	C 2.05, Mn .70, Si .30, Cr 11.50, V .60	Oil Mach. 40 Movement +A
Cold Work Dies (Heading)	UHB-19VA Water Hardening	W2	C .92, Mn .30, Si .25, V .10	Water Mach. 100 Movement C
Diecasting Dies	UHB SPECIAL Air Hardening	H12	C .35, Mn .40, Si 1.05, Cr 5.00, W 1.50, Mo 1.65	Air Mach. 70 Movement +A
Diecasting Dies	UHB ORVAR Air Hardening	H13	C .38, Mn .35, Si 1.00, Cr 5.25, Mo 1.35, V 1.00	Air Mach. 70 Movement A
Gages	(See UHB-46, UHB-151, TRIMO, TRIVAN Listed Above)			
Hot Work Dies (Forging Die Inserts, Hot Swaging Dies)	(See UHB-711 Listed Above)			
Hot Work Dies (Hot Forming, Hot Punching and Shearing)	(See UHB ORVAR, UHB SPECIAL Listed Above)			
Plastic Molding Dies (Hubbed Cavity Dies)	UHB FORMA Water Hardening	P1	C .05 Max., Mn .10 Max., Si .10 Max.	Water Movement C

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium, ★ % Machinability Annealed Movement in Hardening.
Plastic Molding Dies (Hubbed Cavity Dies)	UHB PREMO — Oil or Air Hardening	P4	C .04, Mn .10, Si .10, Cr 3.90, Mo .50	Oil or Air Movement A
Plastic Molding Dies (Machine Cut Cavity Dies)	(See UHB-46 Listed Above)			
Plastic Molding Dies (Hubs)	(See UHB-711, TRIMO Listed Above)			
Punching & Shearing	(See UHB-711 Listed Above)			
Shock Resisting	UHB RESISTO — Oil or Water Hardening	S5	C .60, Mn .70, Si 1.85, Mo .45, V .20	Oil or Water Mach. 65 Movement ±B
Shock Resisting	(See UHB-711 Listed Above)			

UNIVERSAL-CYCLOPS STEEL CORP., Titusville, Pa. — Listing No. 60

Cold Work Dies (Blanking, Forming)	ALCO M — Oil Hardening	S1	C .50, Mn .25, Si .25, Cr 1.50, W 2.25, V .25, Mo .30	Oil Mach. 85 Movement +B
Cold Work Dies (Blanking, Forming)	ALLOY B — Water Hardening	L1	C 1.00, Mn .35, Si .25, Cr 1.35	Water Mach. 95 Movement +C
Cold Work Dies (Blanking, Forming)	CYCLOPS EXTRA — Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	CYCLOPS SPECIAL — Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	CYCLOPS STANDARD — Water Hardening	W1	C 1.00, Mn .25, Si .25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	DRACO DV — Water Hardening	W2	C 1.00, Mn .25, Si .25, V .50	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	DRACO EXTRA — Water Hardening	W2	C 1.00, Mn .25, Si .25, V .25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	DRACO SPECIAL — Water Hardening	W2	C 1.00, Mn .25, Si .25, V .25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	DRACO STANDARD — Water Hardening	W2	C 1.00, Mn .25, Si .25, V .25	Water Mach. 100 Movement +C
Cold Work Dies (Blanking, Forming)	EK-81 — Air Hardening	D5	C 1.35, Mn .30, Si .25, Cr 12.75, Mo .80, Co 3.00	Air Mach. 50 Movement +A
Cold Work Dies (Blanking, Forming)	HERCULES — Water Hardening	W7	C 1.00, Mn .30, Si .25, Cr .50, V .20	Water Mach. 95 Movement +C
Cold Work Dies (Blanking, Forming)	MOTUNG P&D — Oil or Salt	M1	C .75, Mn .30, Si .30, Cr 4.00, W 1.50, V 1.15, Mo 8.50	Oil or Salt Mach. 60 Movement +B
Cold Work Dies (Blanking, Forming)	N-9 — Oil Hardening	L6	C .75, Mn .40, Si .25, Cr 1.00, Ni 1.50	Oil Mach. 80 Movement +B
Cold Work Dies (Blanking, Forming)	ORION — Oil Hardening	L2	C .50, Mn .70, Si .25, Cr 1.00, V .20	Oil Mach. 100 Movement +B
Cold Work Dies (Blanking, Forming)	SPARTA — Air Hardening	A2	C 1.00, Mn .65, Si .25, Cr 5.25, V .25, Mo 1.10	Air Mach. 75 Movement +A
Cold Work Dies (Blanking, Forming)	SPARTA CV — Air Hardening		C 2.30, Mn .65, Si .40, Cr 5.25, W 1.10, V 4.60, Mo 1.10	Air Mach. 60 Movement +A
Cold Work Dies (Blanking, Forming)	THERMOLD J — Air Hardening		C .50, Mn .40, Si 1.10, Cr 5.00, V 1.00, Mo 1.40, Ni 1.50	Air Mach. 80 Movement +A
Cold Work Dies (Blanking, Forming)	ULTRADIE #1 — Air Hardening	D3	C 2.25, Mn .30, Si .25, Cr 12.00, V .20	Air Mach. 50 Movement +A
Cold Work Dies (Blanking, Forming)	ULTRADIE #2 — Air Hardening	D2	C 1.50, Mn .30, Si .25, Cr 12.00, V .20, Mo .80	Air Mach. 55 Movement +A
Cold Work Dies (Blanking, Forming)	ULTRADIE #3 — Air Hardening	D2	C 1.50, Mn .30, Si .25, Cr 12.00, V .90, Mo .80	Air Mach. 55 Movement +A
Cold Work Dies (Blanking, Forming)	WANDO — Oil Hardening	O1	C .90, Mn 1.20, Si .25, Cr .50, W .50, V .20	Oil Mach. 85 Movement +B
Cutting Tools (Finishing)	B-6 — High Speed	T1	C .75, Mn .30, Si .35, Cr 4.00, W 18.00, V 1.20	Oil or Salt Mach. 60 Movement +B
Cutting Tools (Finishing)	B-9 — High Speed	T2	C .84, Mn .30, Si .35, Cr 4.50, W 18.25, V 2.25, Mo .50	Oil or Salt Mach. 60 Movement +B
Cutting Tools (Finishing)	MOTUNG — High Speed	M1	C .80, Mn .30, Si .35, Cr 4.00, W 1.50, V 1.15, Mo 8.50	Oil or Salt Mach. 65 Movement +B
Cutting Tools (Finishing)	MOTUNG 652 — High Speed	M2	C .83, Mn .30, Si .35, Cr 4.00, W 6.00, V 1.90, Mo 5.00	Oil or Salt Mach. 60 Movement +B
Cutting Tools (Finishing)	MOVAN — High Speed	M10	C .83, Mn .30, Si .35, Cr 4.00, V 2.10, Mo 8.00	Oil or Salt Mach. 65 Movement +B
Cutting Tools (Finishing)	SATURN — Water Hardening	F2	C 1.35, Mn .25, Si .25, W 3.50	Water Mach. 85 Movement +C
Cutting Tools (Finishing)	UNICUT — High Speed	M3 type 1	C 1.00, Mn .30, Si .35, Cr 4.00, W 6.25, V 2.40, Mo 5.25	Oil or Salt Mach. 60 Movement +B
Cutting Tools (Roughing)	B-7 — High Speed	T4	C .72, Mn .30, Si .35, Cr 4.00, W 18.00, V 1.15, Mo .50, Co 5.00	Oil or Salt Mach. 60 Movement +B
Cutting Tools (Roughing)	B-8 — High Speed	T8	C .78, Mn .30, Si .35, Cr 4.25, W 14.00, V 2.25, Mo .50, Co 5.00	Oil or Salt Mach. 60 Movement +B
Cutting Tools (Roughing)	B-10 — High Speed	T5	C .78, Mn .30, Si .35, Cr 4.50, W 18.50, V 2.00, Mo 1.00, Co 9.00	Oil or Salt Mach. 55 Movement +B
Cutting Tools (Roughing)	SUPER MOTUNG — High Speed	M30	C .82, Mn .30, Si .35, Cr 4.00, W 1.50, V 1.25, Mo 8.25, Co 5.00	Oil or Salt Mach. 65 Movement +B
Cutting Tools (Roughing)	SUPER UNICUT — High Speed	M15	C 1.50, Mn .30, Si .35, Cr 4.00, W 6.25, V 4.75, Mo 3.25, Co 5.00	Oil or Salt Mach. 55 Movement +B
Cutting Tools (Roughing)	(See MOTUNG 652, UNICUT Listed Above)			
Diecasting Dies	K-8 — Air Hardening	H14	C .40, Mn .35, Si .90, Cr 5.00, W 5.00, Mo .25	Air Mach. 65 Movement +A
Diecasting Dies	THERMOLD A — Air Hardening	H11	C .35, Mn .40, Si 1.00, Cr 5.00, V .45, Mo 1.40	Air Mach. 70 Movement +A
Diecasting Dies	THERMOLD AV — Air Hardening	H13	C .35, Mn .40, Si 1.00, Cr 5.00, V 1.00, Mo 1.40	Air Mach. 70 Movement +A
Gages	(See CYCLOPS SPECIAL, WANDO, SPARTA, ULTRADIE 1, ULTRADIE 3, Listed Above)			
Hot Work Dies (Hot Forming)	ALCO S — Oil Hardening	S1	C .50, Mn .25, Si 1.00, Cr 1.75, W 2.25, V .25, Mo .50	Oil Mach. 85 Movement +B
Hot Work Dies (Hot Forming)	B-4 — Oil Hardening	H24-H25	C .50, Mn .30, Si .25, Cr 2.75, W 15.00, V .50	Oil Mach. 65 Movement +B
Hot Work Dies (Hot Forming)	B-6-X — Oil Hardening	H26	C .50, Mn .25, Si .35, Cr 3.75, W 17.50, V .90	Oil Mach. 60 Movement +B
Hot Work Dies (Hot Forming)	B-44 — Oil Hardening	H22	C .33, Mn .25, Si .35, Cr 3.00, W 11.00, V .40	Oil Mach. 65 Movement +B
Hot Work Dies (Hot Forming)	B-44-J — Oil Hardening	H21	C .32, Mn .25, Si .35, Cr 3.25, W 9.50, V .50	Oil Mach. 70 Movement +B

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work Dies (Hot Forming)	K-L Oil Hardening		C .35, Mn .60, Si 1.50, Cr 7.25, W 7.25	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	K-M Oil Hardening		C .45, Mn .60, Si 1.50, Cr 7.25, W 7.25	Oil Mach. 65 Movement + B
Hot Work Dies (Hot Forming)	K-390 Oil Hardening		C .25, Mn .40, Si .40, Cr 2.75, W 10.00, Ni 2.00	Oil Mach. 55 Movement + B
Hot Work Dies (Hot Forming)	THERMOLD B Air Hardening	H12	C .35, Mn .40, Si 1.00, Cr 5.00, W 1.40, V .30, Mo 1.55	Air Mach. 70 Movement + A
Hot Work Dies (Hot Forming)	THOR Oil Hardening	H23	C .32, Mn .35, Si .50, Cr 12.00, W 12.00, V 1.00	Oil Mach. 50 Movement + B
Hot Work Dies (Hot Forming)	(See THERMOLD A, THERMOLD AV, THERMOLD J, K-8, ALCO M, Listed Above)			
Hot Work Dies (Hot Punching and Shearing)	(See MOTUNG P&D, ALCO M, ALCO S, B-8-X, B-44-J, THERMOLD A, THERMOLD AV, THERMOLD B, THERMOLD J, Listed Above)			
Plastic Molding Dies (Ejector Pins)	VENANGO SPECIAL Oil Hardening		C .65, Mn .50, Si 1.10, V .20, Mo .50	Oil Mach. 9 Movement + B
Plastic Molding Dies (Ejector Pins)	(See CYCLOPS EXTRA and ALCO M Listed Above)			
Plastic Molding Dies (Hubs)	(See N-9, WANDO, ALCO M, SPARTA, ULTRADIE 3, Listed Above)			
Plastic Molding Dies (Machine Cut Cavities)	UNILOY 1435 Oil Hardening	420	C .40, Mn 40, Si .30, Cr 13.00	Oil Mach. 70 Movement + B
Plastic Molding Dies (Machine Cut Cavities)	UNILOY 1860 Oil Hardening	440A	C .60, Mn .40, Si .30, Cr 17.00	Oil Mach. 60 Movement + B
Plastic Molding Dies (Machine Cut Cavities)	(See WANDO, THERMOLD AV, THERMOLD B, SPARTA, Listed Above)			
Punching and Shearing	CYCLOPS 67 Water, Oil Hardening	S4-S5	C .55, Mn .90, Si 2.00, Mo .20	Water, Oil Mach. 9 Movement + C, + B
Punching and Shearing	VENANGO Oil Hardening	S2	C .50, Mn .45, Si 1.10, V .20, Mo .50	Oil Mach. 9 Movement + B
Punching and Shearing	(See DRACO, VENANGO SPECIAL, ORION, N-9, HERCULES, WANDO, ALCO M, ALCO S, SPARTA, ULTRADIE 1, ULTRADIE 2, ULTRADIE 3, MOTUNG P&D, Listed Above)			
Shock Resisting (Intermittent Impact)	(See ORION, N-9, DRACO, Listed Above)			
Shock Resisting (Repeated Impact)	(See CYCLOPS EXTRA, CYCLOPS 67, VENANGO, VENANGO SPECIAL, N-9, ALCO M, ALCO S, Listed Above)			

VANADIUM-ALLOYS STEEL CO., Latrobe, Pa. (also Anchor Drawn Steel Co., Colonial Steel Co.)

Listing No. 61

Brick Mold Liners	CHROMEWEAR Air Hardening		C 2.30, Mn .70, Cr 5.25, W 1.10, Mo 1.10, V 4.75, Si .40	Air Mach. 40 Movement A
Cold Work Dies (Heading)	COLONIAL No. 14 Water Hardening	W1	C Opt., Mn .25, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Heading)	COLONIAL No. 7 Water Hardening	W2	C Opt., Mn .20, V .20, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Heading)	COLHED Water Hardening	W3	C 1.00, Mn .25, V .45, Si .25	Water Mach. 100 Movement C
Cold Work Dies (Blanking, Forming)	AIR HARD Air Hardening	A2	C 1.00, Mn .60, Cr 5.25, Mo 1.10, V .25, Si .30	Air Mach. 85 Movement A
Cold Work Dies (Blanking, Forming)	COLONIAL No. 6 Oil Hardening	O1	C .95, Mn 1.20, Cr .50, W .50, V .20, Si .30	Oil Mach. 90 Movement A
Cold Work Dies (Blanking, Forming)	CROCAR Air, Oil Hardening	D4	C 2.20, Mn .20, Cr 12.00, V .80, Co .50, Si .30, Mo .80	Oil, Air Mach. 40 Movement A
Cold Work Dies (Blanking, Forming)	OHIO DIE Air Hardening	D2	C 1.55, Mn .25, Cr 12.00, Mo .80, V .80, Co .40, Si .35	Air Mach. 45 Movement A
Cold Work Dies (Blanking, Forming)	NEATRO Oil Hardening, High Speed	M4	C 1.27, Mn .25, Cr 4.50, W 5.50, Mo 4.50, V 4.00, Si .30	Oil Mach. 45 Movement A
Cold Work Dies (Lamination)	(See CROCAR, OHIO DIE, NEATRO Listed Above)			
Cold Work Dies (Drawing)	(See COLONIAL No. 14, CROCAR, OHIO DIE, CHROMEWEAR Listed Above)			
Cutting Tools (Roughing)	GRAY CUT COBALT Oil, Air Hardening, High Speed	T6	C .80, Mn .25, Cr 4.25, W 20.50, Mo .60, V 1.60, Co 12.25	Oil Mach. 45 Movement A
Cutting Tools (Roughing)	RED CUT COBALT Oil, Air Hardening, High Speed	T4	C .75, Mn .20, Cr 4.25, W 18.25, Mo .65, V 1.05, Co 4.75, Si .30	Oil Mach. 50 Movement A
Cutting Tools (Roughing)	RED CUT COBALT B Oil, Air Hardening, High Speed	T5	C .78, Mn .25, Cr 4.25, W 18.50, Mo .75, V 1.55, Co 8.75, Si .30	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	E.V.M. Oil, Air Hardening, High Speed	T2	C .85, Mn .25, Cr 4.25, W 18.10, V 2.00, Si .25	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	RED CUT SUPERIOR Oil, Air Hardening, High Speed	T1	C .72, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	VAN CUT Oil, Air Hardening, High Speed	M3	C 1.02, Mn .25, Cr 4.00, W 6.00, Mo 5.50, V 2.50, Si .20	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	VAN-LOM Oil Hardening, High Speed	M10	C .87, Mn .20, Cr 4.00, Mo 8.25, V 1.95, Si .30	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	VASCO SUPREME Oil, Air Hardening, High Speed	T15	C 1.50, Mn .25, Cr 4.75, W 12.50, V 5.00, Co 5.00, Si .25	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	VASCO SUPREME A Oil, Air Hardening, High Speed	M15	C 1.50, Mn .25, Cr 4.75, W 6.50, Mo 3.00, V 5.00, Co 5.00, Si .25	Oil Mach. 45 Movement A
Cutting Tools (Roughing, Finishing)	VASCO M-2 Oil, Air Hardening, High Speed	M2	C .83, Mn .25, Cr 4.20, W 6.35, Mo 5.00, V 1.90, Si .30	Oil Mach. 55 Movement A
Cutting Tools (Roughing, Finishing)	S-N-2 Oil Hardening, High Speed	M1	C .79, Mn .20, Cr 3.75, W 1.50, Mo 8.00, V 1.10, Si .25	Oil Mach. 60 Movement A
Cutting Tools (Roughing, Finishing)	(See NEATRO Listed Above)			
Cutting Tools (Drills)	(See VASCO M-2 Listed Above)			
Cutting Tools (Taps)	RED STAR TUNGSTEN Oil Hardening	O7	C 1.20, Mn .35, Cr .70, W 1.60, Mo .25, V .25, Si .30	Oil Mach. 90 Movement C
Cutting Tools (Taps)	(See VASCO M-2, RED CUT SUPERIOR Listed Above)			
Cutting Tools (Thread Chasers)	(See VASCO M-2, RED CUT SUPERIOR Listed Above)			
Diecasting Dies (Molds, Ejector Pins)	HOTFORM Air Hardening	H11, 12	C .35, Mn .30, Cr 5.00, W Opt., Mo 1.40, V .45, Si .90	Air Mach. 75 Movement A
Diecasting Dies (Trimming Dies)	(See COLONIAL No. 6, AIR HARD, OHIO DIE, CROCAR Listed Above)			
Gages	(See COLONIAL No. 6, CROCAR, CHROMEWEAR Listed Above)			
High Stress Machinery Parts	NIKRO M Oil Hardening	L6	C .70, Mn .55, Cr .85, Mo .25, Si .30, Ni 1.40	Oil Mach. 75 Movement A
High Stress Machinery Parts	VANADIUM Types D, G, H, K, N Water, Oil Hardening	L2	C Opt., Mn .20, Cr .80, V .20, Si .25	Water Mach. 90 Movement C
High Stress Machinery Parts	VANADIUM Type BB Water, Oil Hardening	L3	C 1.00, Mn .32, Cr 1.40, V .20, Si .25	Water Mach. 85 Movement C

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Hot Work Dies (Hot Forming)	FORGE DIE Oil Hardening	H25	C .28, Mn .25, Cr 3.50, W 14.00, V .50, Si .25	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	HOTFORM No. 3 Air Hardening		C .52, Mn .30, Cr 4.75, W 1.20, Mo 1.40, Si .90	Air Mach. 75 Movement A
Hot Work Dies (Hot Forming)	HOTPRESS Oil Hardening	H20	C .35, Mn .35, Cr 2.00, W 9.25, V .50, Si .25	Oil Mach. 60 Movement A
Hot Work Dies (Hot Forming)	MARVEL Oil Hardening	H21	C .33, Mn .20, Cr 3.50, W 9.75, V .45, Si .30	Oil Mach. 60 Movement A
Hot Work Dies (Hot Forming)	RED CUT SUPERIOR 3 Oil Hardening	H26	C .52, Mn .20, Cr 4.00, W 18.00, V 1.00, Si .32	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	SC SPECIAL Oil Hardening	H24	C .47, Mn .30, Cr 2.75, W 14.00, V .50, Si .30	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	WW HOTWORK Oil Hardening	H23	C .32, Mn .35, Cr 12.00, W 12.00, V 1.05, Si .50	Oil Mach. 55 Movement A
Hot Work Dies (Hot Forming)	(See HOTFORM Listed Above)			
Hot Work Dies (Hot Punching & Shearing)	(See HOTFORM, MARVEL Listed Above)			
Plastic Molding Dies (Machined Cavity)	MC Oil Hardening	P20	C .35, Mn .85, Cr .85, Mo .40, Si .40	Oil Mach. 85 Movement A
Plastic Molding Dies (Machined Cavity)	SPEED CUT Oil Hardening	P20	C .43, Mn .85, Cr 1.15, Mo .50, Si .30	Oil Mach. 140 Movement A
Plastic Molding Dies (Hubs)	PAR-EXC Oil Hardening	S1	C .50, Mn .20, Cr 1.65, W 2.00, V .25, Si .25	Oil Mach. 80 Movement A
Plastic Molding Dies (Hubs)	(See COLONIAL No. 6, AIR HARD, CROCAR, OHIO DIE Listed Above)			
Plastic Molding Pins (Ejector Pins)	(See HOTFORM Listed Above)			
Punching & Shearing	MOSIL Oil Hardening	S5	C .57, Mn .85, Cr .25, Mo .35, V .20, Si 1.90	Oil Mach. 85 Movement B
Punching & Shearing	SILMAN Water, Oil Hardening	S4	C .55, Mn .85, Cr .25, V .20, Si 2.00	Water Mach. 85 Movement C
Punching & Shearing	(See AIR HARD, COLONIAL No. 7, OHIO DIE Listed Above)			
Shear Knives	(See AIR HARD, CROCAR, OHIO DIE Listed Above)			
Shock Resisting (Intermittent & Repeated Impact)	(See SILMAN, MOSIL, PAR-EXC, COLONIAL No. 7 Listed Above)			
Thread Rolling	(See OHIO DIE Listed Above)			

VASCOLOY-RAMET CORP., 800 Market St., Waukegan, Ill. — Listing No. 62

Cutting Tools (Heavy Duty Roughing, Interrupted Cuts, Cast Iron and Nonferrous) ..... 2A3, Carbide

Cutting Tools (Roughing Cuts, Cast Iron and Nonferrous) .. 2A65, Carbide

Cutting Tools (General Purpose, Cast Iron and Nonferrous) .. 2A5, Carbide

Cutting Tools (Finishing, Cast Iron and Nonferrous) ..... 2A7, Carbide

Cutting Tools (Heavy Duty Roughing, Severe Interrupted Cuts, Steel) ..... AW, Carbide

Cutting Tools (Heavy Duty Roughing, Steel) ..... 50H, Carbide

Cutting Tools (Roughing, Steel) ..... EE, Carbide

Cutting Tools (General Purpose, Steel) ..... EM, Carbide

Cutting Tools (Finishing, Steel) ..... E, Carbide

Cutting Tools (Precision Finishing, Steel) ..... EH, Carbide

Cutting Tools (Roughing, Finishing, Cast Iron and Steel) ..... Tantung, (Cast Alloy)

Shock Resisting (Mining Tools, Severe Shock) ..... 2A1, Carbide

Shock Resisting (Mining Tools, General Purpose) ..... 9292, Carbide

VULCAN CRUCIBLE STEEL CO., Division of H. K. Porter Co. Inc., Aliquippa, Pa. — Listing No. 63

Cold Heading Dies	EXTRA Water Hardening	W1	C .90-1.10, Mn .30, Si .25	Brine, Water
Cold Heading Dies	SPECIAL VANADIUM Water Hardening	W2	C .80-1.00, Mn .30, Si .25	Brine, Water
Cold Heading Dies (Inserts)	ALIDIE High-Carbon, High-Chrome	D2	C 1.55, Mn .30, Cr 12.00, Mo .75, V .25, Si .30	Air
Cold Heading Dies (Inserts)	TM-6 High Speed	M2	C .83, Mn .30, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Si .30	Oil, Air, Salt
Cold Heading Dies (Inserts)	WOLFRAM High Speed	T1	C .73, Mn .30, Cr 4.00, W 18.25 V 1.10, Si .30	Oil, Air, Salt
Cold Heading Dies (Press Fit Holders)	AUTO CR-V Tool Steel	L2	C .50, Mn .80, Cr 1.00, Va .20, Si .25	Oil, Water
Cold Heading Dies (Shrink or Press Fit Holders)	TCM Air Hardening	H12	C .35, Mn .40, Cr 5.00, Mo 1.50, V .25, Si 1.00	Air
Cold Work Dies (Blanking)	TM-6-FM High Speed	M2	C .83, Mn .30, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Si .30	Oil, Air, Salt
Cold Work Dies (Blanking)	(See WOLFRAM, TM-6 Listed Above)			
Cold Work Dies (Blanking, Forming)	ALIDIE-FM High-Carbon, High-Chrome	D2	C 1.55, Mn .30, Cr 12.00, Mo .75, V .25, Si .30	Air
Cold Work Dies (Blanking, Forming)	NON SHRINKABLE Oil Hardening		C .90, Mn 1.50, Cr .20, Si .30	
Cold Work Dies (Blanking, Forming)	OIL HARDENING Oil Hardening	O1	C .90, Mn 1.20, Cr .50, W .50, Si .30	Oil
Cold Work Dies (Blanking, Forming)	(See SPECIAL VANADIUM Listed Above)			
Cold Work Dies (Blanking, Forming)	VAIRLOY Air Hardening	A4	C 1.00, Mn 2.00, Cr .90, Mo .90, Si .30	Air
Cold Work Dies (Blanking, Forming)	VULDIE, VULDIE-FM Air Hardening	A2	C 1.00, Mn .40, Cr 5.25, V .40, Mo 1.15, Si .30	Air
Cold Work Dies (Blanking, Forming)	(See ALIDIE Listed Above)			
Cold Work Dies (Forming)	K. R. Water Hardening	W5	C 1.10, Mn .30, Cr .60, Si .25	Brine, Water
Cutting Tools (Finishing)	SUPER High Speed	T2	C .80, Mn .30, Cr 4.25, W 18.50, Mo .80, V 2.15, Si .30	Oil, Air, Salt
Cutting Tools (General Purpose)	(See TM-6, TM-6-FM Listed Above)			
Cutting Tools (General Purpose)	(See WOLFRAM Listed Above)			
Cutting Tools (Roughing)	WOLFRAM COBALT High Speed	T4	C .72, Mn .30, Cr 4.00, W 18.25 Mo .60, V 1.15, Si .30, Co 5.25	Oil, Air, Salt
Diecasting Dies (Aluminum Base)	TCM Hot Work Tool Steel	H12	C .35, Mn .40, Cr 5.00, W 1.40, Mo 1.50, V .25, Si 1.00	Air
Diecasting Dies (Aluminum Base)	VULCAST Hot Work Tool Steel	H13	C .40, Mn .40, Cr 5.00, Mo 1.35, V 1.00, Si 1.00	Air
Diecasting Dies (Brass)	A-42 Hot Work Tool Steel		C .30, Mn .30, Cr 2.75, W 9.75 Si .30, Ni 1.65	Air

★ Last column indicates suggested Quenching Medium; Machinability Annealed using base 100 for carbon and low alloy steels; and Movement in Hardening by "A" for slight, "B" for intermediate, "C" for considerable movement — "+" denotes expansion, "—" denotes contraction.

PRIMARY APPLICATION	TRADENAME	AISI-SAE TYPE	ANALYSIS (%)	Quenching Medium. ★ % Machinability Annealed Movement in Hardening.
Diecasting Dies (Brass)	30 CALO FERRO Hot Work Tool Steel	H21	C .30, Mn .30, Cr 3.25, W 9.75 V .50, Si .30	Air
Gages	(See WOLFRAM, TM-6, ALIDIE, VULDIE, VAIRLOY, OIL HARDENING, NON SHRINKABLE, SPECIAL VANADIUM Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	(See A-42, 30 CALO FERRO Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	TM-6, LOW CARBON Low Carbon High Speed	H42	C .63, Mn .30, Cr 4.15, W 6.40, Mo 5.00, V 1.90, Si .30	Oil, Air, Salt
Hot Extrusion Dies (Aluminum, Magnesium)	(See TCM, VULCAST Listed Above)			
Hot Extrusion Dies (Copper, Brass, Bronze)	WOLFRAM, LOW CARBON Low Carbon High Speed	H26	C .53, Mn .30, Cr 4.00, W 18.25, V 1.10, Si .30	Oil, Air, Salt
Hot Work Dies	(See TCM, VULCAST Listed Above)			
Hot Work Dies	(See WOLFRAM, LOW CARBON; TM-6, LOW CARBON Listed Above)			
Hot Work Dies	(See 30 CALO FERRO, A-42 Listed Above)			
Hot Work Dies	50 CALO FERRO Hot Work Tool Steel	H26	C .50, Mn .30, Cr 3.00, W 14.75, V .50, Si .30	Air
Hot Work Dies (High Toughness)	A-41 Hot Work Tool Steel		C .45, Mn .70, Cr 1.60, Mo 1.10, V .25, Si .25	Air, Oil
Machinery Parts (High Stress, Good Wear)	(See AUTO Listed Above)			
Plastic Molding Dies (Hubbed Die Cavities)	PLASTIC DIE Water Hardening	P1	C .08 Max	Carburize, Water Harden
Plastic Molding Dies (Hubbed Die Cavities)	VULMOLD Oil Hardening		C .10 Max, Mn .70, Cr 1.40, Mo .25, Ni .50, Si .25	Carburize, Oil Harden
Plastic Molding Dies (Hubs)	QA	S1	C .47, Mn .30, Cr 1.20, W 2.20, V .25, Si .25	Oil, Water
Plastic Molding Dies (Machine Cut Cavity Dies)	(See VAIRLOY, OIL HARDENING, NON SHRINKABLE Listed Above)			
Punching, Shearing	(See ALIDIE, VULDIE, VAIRLOY, OIL HARDENING, NON SHRINKABLE, SPECIAL VANADIUM, QA Listed Above)			
Punching, Shearing (Maximum Toughness)	4870		C .55, Mn .85, Cr .25, V .25, Si 2.00	Oil, Water

WESSON CO., 1220 Woodward Heights Blvd., Detroit 20, Mich. — Listing No. 64

Cutting Tools (Heavy Rough Turning, Cast Iron, Nonferrous) .GS, Carbide
Cutting Tools (General Purpose Machining, Cast Iron, Nonferrous) .GI, Carbide
Cutting Tools (Finish Machining, Cast Iron, Nonferrous) ....GA, Carbide
Cutting Tools (Precision Finishing, Cast Iron, Nonferrous) ...GF, Carbide
Cutting Tools (Heavy Rough Turning, Forged, Rolled, Cast Steel) .WS, Carbide
Cutting Tools (General Purpose Machining, Steel) .....WM, Carbide
Cutting Tools (Light Roughing, Finishing, Steel) .....WH, Carbide
Cutting Tools (Precision Finishing, Steel) .....WH, Carbide
Cutting Tools (Heavy Duty Metal Cutting, Shock Resistance) ..M, Carbide
Cutting Tools (Rough Machining, Aluminum) .....GS, Carbide
Cutting Tools (Finish Machining, Aluminum) .....GI, Carbide
Mechanical Application (Extreme Wear Resistance) .....GI, Carbide
Mechanical Application (Wear & Light Shock Resistance) ....GS, Carbide
Mechanical Application (Wear & Heavy Shock Resistance) ...M, Carbide

WILLEY'S CARBIDE TOOL CO., 1340 W. Vernor Highway, Detroit 1, Mich. — Listing No. 65

Cutting Tools (Chip Removal, Cast Iron, Nonferrous Roughing) .....E-8, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous General Purpose) .....E-6, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous Light Finishing) .....E-5, Carbide
Cutting Tools (Chip Removal, Cast Iron, Nonferrous Precision Finishing) ..E-3, Carbide
Cutting Tools (Chip Removal, Steel, Roughing) .....8-A, Carbide
Cutting Tools (Chip Removal, Steel, Heavy Duty Machining) .....945, Carbide
Cutting Tools (Chip Removal, Steel, General Purpose) .....710, Carbide
Cutting Tools (Chip Removal, Steel, Finishing and Light Roughing) .....606, Carbide
Cutting Tools (Chip Removal, Steel, Precision Finishing) .....509, Carbide
Cutting Tools (High Speed Finishing) .....6A, Carbide
Wear and Impact Applications (Light Impact, Extreme Wear Resistant) .....E-13, Carbide
Wear and Impact Applications (Medium Impact, Wear Resistant) .....E-18, Carbide
Wear and Impact Applications (Heavy Impact, Wear Resistant) .....E-25, Carbide

ZIV STEEL & WIRE CO., 2945 W. Harrison St., Chicago 12, Ill. — Listing No. 66

Cold Work Dies (Blanking)	HARGUE Oil Hardening	O1	C .85-.95, Mn 1.00-1.25, Cr .50, W .50	Oil
Cold Work Dies (Forming, Punches, Rolls)	PRK-33 Air Hardening	D5	C 1.30-1.50, Mn .20-.30, Cr 12.50-14.50, Mo .65-.75, Co 3.00-3.50, Si .40-.65, Ni .50	Air
Cold Work Dies (Blanking, Forming)	NEOR Oil Hardening	D3	C 2.10-2.20, Mn .40-.60, Cr 12.75-13.75, Si .30-.60, Ni .50	Oil
Cold Work Dies (Rolls)	DUMORE Air Hardening	A2	C .95-1.05, Mn .50-.80, Cr 5.00-5.50, Mo .95-1.25	Air
Cold Work Dies (Blanking, Forming, Rolls, etc.)	LUBRI-DIE Oil Hardening	O6	C 1.35-1.50, Mn .40-1.00, Mo .20-.30, Si .75-1.25	Oil
Cold Work Dies (Blanking, Forming, Punches, Rolls, etc.)	DARWIN #1 Air Hardening	D2	C 1.50, Mn .35, Cr 11.00-13.00, Mo .75, Si .40, Ni .40, V .25	Air
Cutting Tools	SUPER HIGH SPEED Oil Hardening	T1	C .65-.75, Cr 3.50-4.50, W 17.50-19.00, V .90-1.20	Oil
Gages	(See NEOR Listed Above)			
Hobs	WIZARD Oil Hardening	S1	C .40-.50, Mn .20-.40, Cr .85-.95, W .90-1.00, Mo .20	Oil
Hobbed Cavity Dies	HOBALITE Water Hardening		C .05, Mn .15	Water
Hobbed Cavity Dies	HOB-A-DIE Oil Hardening		C .06, Mn .30, Cr 1.00, Mo .25, Si .20	Oil
Hot Work Dies (Hammer)	TYPLEX Air Hardening		C .35-.45, Mn .25-.50, Cr 1.25-1.75, Mo .60-.90, Ni 4.00-4.50	Air
Hot Work Dies (Upsetter)	(See TYPLEX Listed Above)			
Machinery Parts	ZIVAN-45 Oil Hardening		C .40-.50, Mn .60-.90, Cr .80-1.10, V .15 min.	Oil
Punching and Shearing	(See DUMORE Listed Above)			
Punching and Shearing	PLANCHER Oil Hardening	S5	C .55-.65, Mn .70-.90, Si 1.85-2.10, Mo .40-.50	Oil
Shock Resisting	(See WIZARD Listed Above)			

COMPLETING

40

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WATER HARDENING

SAE NO.
W-10 PENCO straight carbon
W-2 BLUE LABEL carbon vanadium
W-7 BLACK LABEL carbon-chrome-vanadium
W-10 DRILL ROD commercial
GRAPH-TUNG graphitic

OIL HARDENING

SAE NO.
O-1 YELLOW LABEL manganese-chrome-tungsten
O-6 GRAPH-MO graphitic

AIR HARDENING

SAE NO.
D-2 WHITE LABEL high carbon-high chrome
A-2 PENAIR #5 5 per cent chrome
AIRSHOCK high impact 3 per cent chrome

SHOCK STEELS

SAE NO.
S-1 BROWN LABEL tungsten chisel
S-5 SILVER LABEL high silicon-manganese chisel

HOT WORK

SAE NO.
H-11 PENCO CR-MO-V chrome moly vanadium
H-12 PENCO CR-MO-W chrome moly tungsten
H-13 HI-VAN chrome-moly-hi-vanadium

HOBBING STEEL

SAE NO.
P-2 O.C.S. OIL HARDENING cavity
P-4 A.C.S.—AIR HARDENING cavity

PRE-HARDENED

BD-30 (brake die) flats and squares 241-269 brinell rounds from 302 to 363 brinell

NON-TEMPERING

PENCO NON-TEMPER oil or water hardening—no draw required

HOLLOBAR

TOOL STEEL TUBING yellow label SAE O-1—graph-mo SAE O-6—white label SAE D-2—2" to 16" O.D. 1" to 10" I.D.

ALLOYS

6145-6150 rounds—squares—flats
8620 rounds ¾" to 9½" hot and cold finished

COLD FINISHED

C-1018 rounds—squares—flats

DRILL ROD

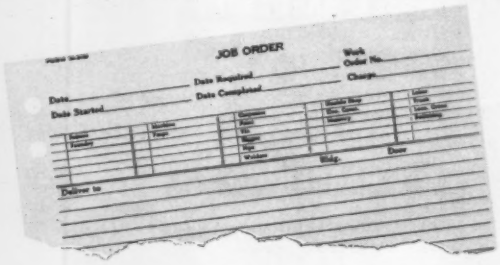
OIL AND WATER HARDENING

FLAT GROUND STOCK

OIL AND AIR HARDENING 1001 sizes

PLATE

1020 SILICON KILLED
X-1515 SPEED CASE free machining carborizing
X-1545 SPEED TREAT free machining flame hardening or heat treatable


JOB ORDER

Work Order No.

Date

Date Started

Date Required

Date Completed

Charge

Deliver to

Maintenance Planning

CENTRALIZED planning and scheduling for shop maintenance are absolutely essential to efficient operation, says J. E. Baltzell Jr., superintendent's office, Armco Steel Corp., Middletown, O. He states these benefits: Better work control and planning; improved spare parts control; more preventive maintenance; and better worker morale.

Needs—An efficient work order system is the primary need in a planning and scheduling office. The form selected must provide for every detail connected with the repair or rebuilding. Sufficient copies of the form must be used to cover stores, vital spares, crafts, supervision and production.

Instruction and education in the use of the form must be repeated from time to time. Simple entries like "make necessary repairs to pump" are inadequate; teach craftsmen to detail their work with better descriptions, like "replaced part No. 33408-S bearing, and part No. 44037 seal. Oil slinger part No. 33409 not used—returned to stock." Such descriptions are of value to planning, and pinpoint weak spots for changes in equipment.

Co-ordination—Work order forms must provide for co-operation and co-ordination between crafts and departments. It obviously is wasteful to schedule painters before the machinists have finished the mechanical overhaul. Production departments must know ahead of time the date and hour equipment goes off production and the date and time you expect to get it back into production.

Overloads call for skillful handling. Each craftsman must know a day ahead what his next job will be. Armco measures workloads and wherever overloads exist, it 1. Renegotiates the "date wanted." 2. Gets approval for overtime. 3. Increases the workforce. 4. Or subcontracts.

Finally, don't forget a controlled vital spares program. Parts absolutely essential and basic must be on hand at all times. You can't leave such planning to chance. Such a program can be tied in with machine shop free time; spares frequently are cheaper to make than to buy.

The "How" of Steel Plant Maintenance

TODAY'S maintenance in a steel mill demands more organization than a simple "what's for tomorrow?" approach. You must consider the equipment to be maintained, departments, production schedules, stores, vital spares, housing and layout, training, organization and preventive techniques. Will you have separate crews for each building? Will they be under central supervision, or the building production superintendent?

These were the questions asked at the recent 7th Plant Maintenance & Engineering Show in Philadelphia. Here are some answers given by J. E. Baltzell Jr., superintendent's office, Armco Steel Corp., Middletown, O., and John J. Weinman, supervisor, planned maintenance department, Wheeling Steel Corp., Yorkville, O.

Organization — Maintenance crews are organized to care for equipment in widely scattered, separate buildings. Each craft is best located in its own building or crib. All maintenance buildings should be as centrally located in the mill as possible.

Armco finds that it needs one maintenance man for every four operating employees. Wheeling (with different problems) manages with one for every five. Crafts are the same: Everything from tinsmiths to blacksmiths.

Grouping of crafts is arranged around the central storehouses to reduce supply time.

Types—There are three basic organizations to choose from: 1. Area. 2. Centralized. 3. Combination.

An area basis is undesirable because supervision usually is given to the production department. Planning is harder and slower; preventive techniques are delayed because of production's natural desire to keep equipment running at any cost.

Wheeling uses a combination operation. In Mr. Weinman's opinion: "The trend is to use the combination of centralized and area maintenance, with as much emphasis on centralization as possible."

Armco also likes the idea of centrally located maintenance shops. It lists these advantages:

1. Shops permit integrated use of skilled workmen in a plant-wide maintenance program.
2. Special equipment and tools needed to complete work orders are all under one roof. Transportation time between buildings is eliminated.
3. A centralized shop reduces capital expense.
4. In emergencies, shops are a

If you were to see such an advertisement would you think it a fraud? If you considered it possible, would you think it was a development of this atomic day in which we live?

Believe it or not, ferro uranium was produced and uranium steel was produced not this month, or this year, but more than thirty-five years ago.

A treatise published in 1921, giving a full account of this unbelievable ferro-alloy said in part:

> "Uranium is supplied to the steel manufacturer in the form of Ferro-uranium. No difficulties in its employment are found, provided that reasonable precautions are taken in its addition; such precautions are explainable by *the remarkable chemical activity of uranium.*"

Prophetic words those! Little did the experimenters of 1921 realize what a monster they had by the tail. In undramatic language, the writer of this treatise suggested that uranium steel would "increase tool life" and concluded by saying, "Uranium steel marks the greatest single advance in alloy steels in recent years." This evaluation of Uranium steel proved to be far too optimistic. It was difficult to control and never won for itself a place in industry.

So we don't have any ferro-uranium for sale, but we are proud of an industry that has enough imagination to run thirty years out beyond the frontiers of scientific knowledge.

We're proud to be a part of the alloy steel industry for whom we have produced quality ferro-alloys for almost a third of a century.

quick and handy source for skilled craftsmen. There is no waiting to find out where skills are working.

5. Shops can be used for plant expansion programs.

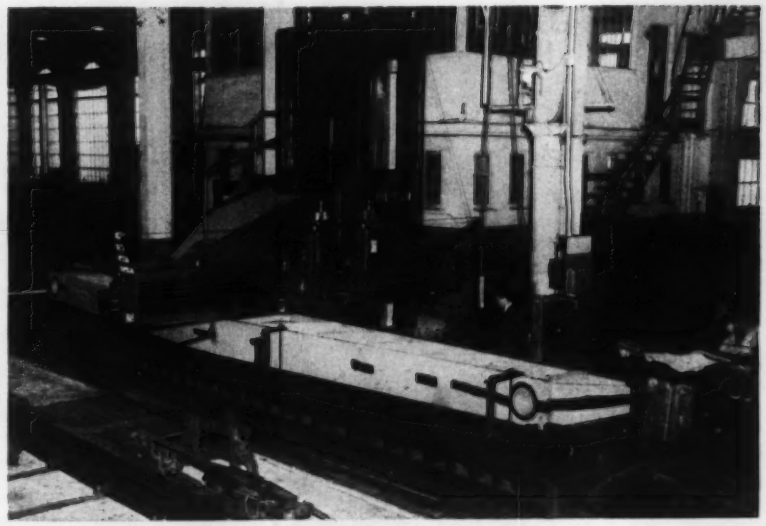
Supervision—In 1946, Wheeling changed from the strict area organization under production supervision to a single maintenance superintendent. This change alone reduced down time and increased production 50 per cent on the same equipment. In addition, the combination of area and central organization has taken on three major additions to equipment without a personnel increase: A continuous, electrolytic tinning line, a side-trim and coil preparation line and a continuous annealing line.

In addition to the superintendent, a general turn (shift) foreman is needed to prevent jurisdictional disputes over equipment breakdowns. For example, if two breakdowns are in separate buildings and each calls for pipefitters, the general turn foreman decides which has priority. This relieves the plant maintenance superintendent if he is off duty or tied up in a meeting.

Shifts—When production is three shifts, seven days a week, it isn't necessary to schedule maintenance on the same basis. Workmen would rather work the day turn as a rule, and shift or turn premiums make it desirable, budgetwise, to keep afternoon and midnight turns at a minimum.

In October, 1955, Wheeling used 142 men on the day turn and only 39 on afternoon and midnights. An additional force of 66 is used on rotation to care for maintenance needs on week ends.

Preventive Maintenance—Many ask the question: "Is preventive maintenance more important for 24-hour plants than for single-shift operations?" Both Armco and Wheeling operate extensive preventive programs, with the planning and scheduling functions. Both feel that a good preventive maintenance program that uses formal, scheduled inspections by competent, independent inspectors is just as important to one-shift operations in their plants as it is to the three-shift, continuous operations.



Openside Planer Takes 30-ft Long Bite

One of the largest of its kind, this Gray openside planer at Bethlehem-Pacific Coast Steel Corp., San Francisco, can handle parts 108 in. high and 120 in. wide. Maximum cutting stroke is 30 ft. The machine is shown planing a 42-ft beam which overhangs the table. The planer can carry loads of over 100 tons

STEEL's Guide to Tool Steels & Carbides

40 pages
Separately bound
Published Mar. 12, 1956
$2 a copy

Listing:

- Companies offering tool and die steels and carbides
- Tool steels and carbides by primary use
- Tool steels and carbides by tradename and type
- Ceramic cutting tools. Tradename and manufacturer
- Chemical analysis of tool steels and carbides
- Suggested quenching media, machinability rating, effects of hardening on tolerance
- AISI and SAE identification and type symbols
- Tradename cross index

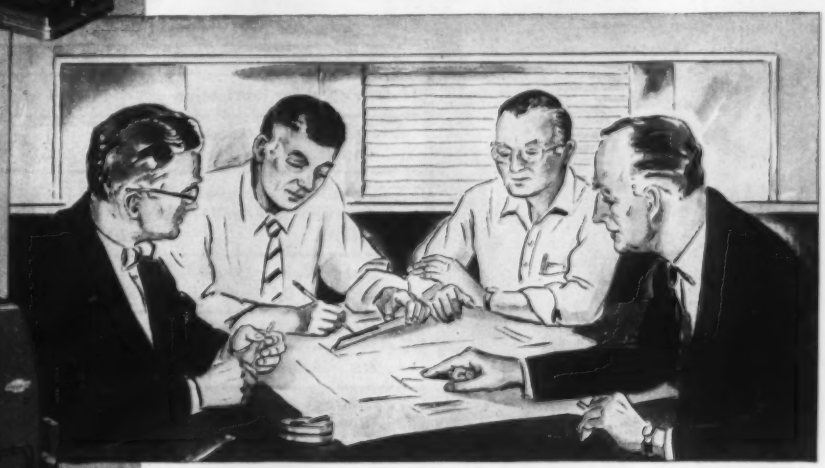
Copies of the Guide to Tool Steels and Carbides are available at $2 each from Editorial Service, STEEL, Penton Bldg., Cleveland 13, O.

(In this issue of STEEL, opposite page 126)

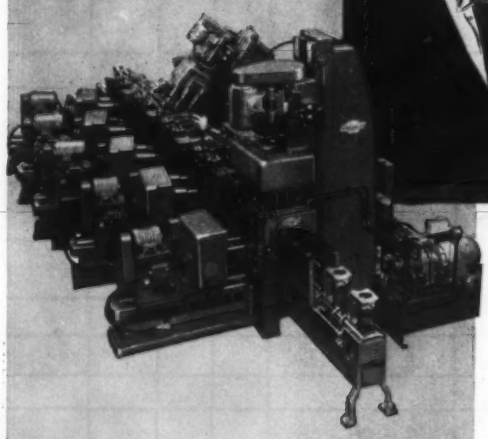
GREENLEE OFFERS

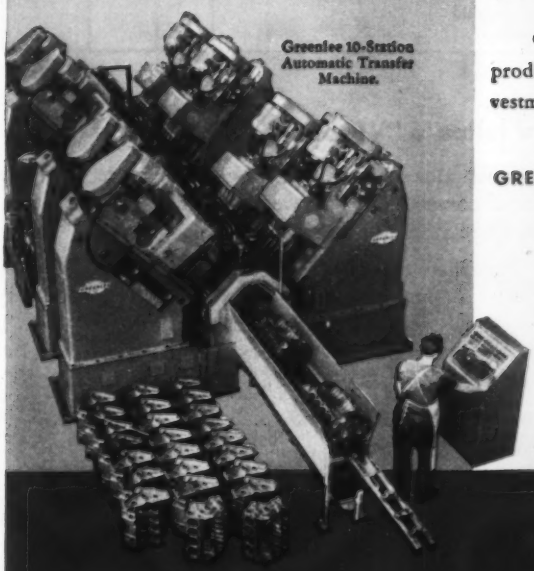
A PROFIT-MAKING INVESTMENT IN HIGH-PRODUCTION MACHINE TOOLS

Greenlee Six-Spindle Automatic Bar Machine.



Greenlee 22-Station Automatic Transfer Machine for machining transmission cases.





Greenlee 10-Station Automatic Transfer Machine.

Greenlee creative thinking, Greenlee engineering and Greenlee experience combined with that of your own engineers will help you "produce more at lower cost."

Ideas, engineering, experience and facilities of Greenlee Bros. & Co. develop improved methods and machines for greater and greater productivity of future models.

Greenlee's adequate facilities expedite the transition from production ideas to production machines . . . a profit-making investment at work in your plant.

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- Multiple-Spindle Drilling and Tapping Machines
- Transfer-Type Processing Machines
- Six and Four-Spindle Automatic Bar Machines
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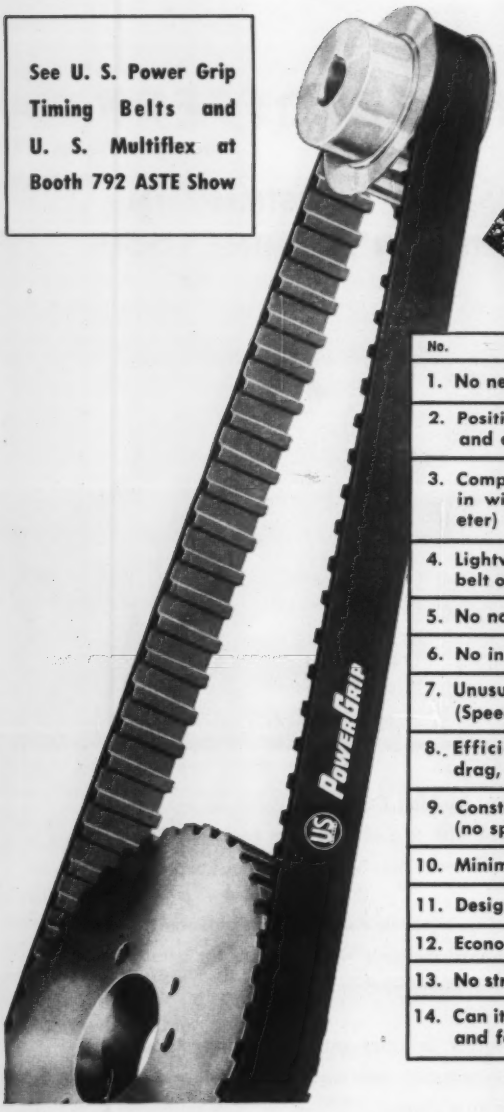

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No.	Advantages	PowerGrip "Timing" Belt	Chain	Gear	V-Belts	Flat Belts
1.	No need for lubrication	√				
2.	Positive elimination of slip and creep	√				
3.	Completely compact (Both in width and pulley diameter)	√				
4.	Lightweight (Heavy duty belt only 0.1 lb./ft./in.)	√				
5.	No noise or vibration	√				
6.	No initial tension	√				
7.	Unusual speed range (Speeds up to 12,000 FPM)	√				
8.	Efficient (Elim. heat, lube drag, high bearing loads)	√				
9.	Constant angular velocity (no speed fluctuation)	√				
10.	Minimum backlash	√				
11.	Design flexibility	√				
12.	Economical	√				
13.	No stretch	√				
14.	Can it be completoly housed and forgotten?	√				

Note that the U. S. PowerGrip "Timing" Belt takes a "√" after every advantage

While every type of drive has certain advantages, *no* type of power transmission possesses *so many* advantages as the U.S. PowerGrip "Timing" Belt drive. For example, *it is the only positive drive that never needs lubrication.*

THE LIST OF USES GROWS DAY BY DAY! Power production machinery in every field is made more efficient, volume of production increased, and maintenance costs lowered with this amazing belt. The list of OEM applications grows too numerous to mention. U.S. PowerGrip has streamlined hundreds of products... made them sell above competition. Some equipment would not be in existence at all, if it weren't for this great belt.

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24th Annual Convention

in conjunction with The 1956 Industrial Exposition

American Society of Tool Engineers
INDUSTRIAL CONFERENCES

GETTING THE MOST from an exposition and convention takes planning. To help you decide which conferences you can't afford to miss, here is a condensed program. Unless otherwise indicated, all conferences will be in rooms A, B, or C on the second floor of North Hall, International Amphitheatre, Chicago.

Dr. Harry B. Osborn Jr.
President

Howard C. McMillen
First Vice President

Monday, Mar. 19

NEW MATERIALS

1:30 p.m.

CERAMIC CUTTING TOOLS

New data on ceramic and boride cutting tool materials.
Speakers: "Ceramic Tooling Brought Up to Date," W. B. Kennedy, Watertown Arsenal; "Cemented Borides for Tool Materials," A. G. Metcalfe, Armour Research Foundation.

2:30 p.m.

GLAMOUR MATERIALS

The drawing of titanium and machining of cermets.
Machining with sound waves.
Speakers: "The Drawing of Titanium," J. S. Kirkpatrick, Brooks & Perkins, Inc.; "Machining With Silent Sound," Jack Welch, The Sheffield Corp.

3:30 p.m.

GRINDING

The latest grinding materials and equipment and methods to improve your present equipment. Electric discharge grinding.
Speakers: "Recent Advances in Grinding Wheels," Carl Soderlund, Norton Co.; "Precision Production Grinding Machines," A. H. Dall, The Cincinnati Milling Machine Co.; "Electrical Discharge Grinding of Tools," V. E. Matulaitis, Elox Corp. of Michigan.

6:30 p.m.

SHAPED DIAMOND TOOLS

(Commons Bldg., Illinois Institute of Technology)

A complete diamond tool symposium and exhibit. Thirteen technical papers; a $4-million display. Dinner and a paper: "Man-Made Diamonds," J. S. Gillespie, Carboloy Department, General Electric Co.

Tuesday, Mar. 20

RESEARCH

9:30 a.m.

SHAPED DIAMOND TOOLS

(Room A)

Crystallography and the selection, preparation and design of diamond tools. How to produce diamond tools.
Speakers: "Crystallography and Grinding Hardness of the Diamond

ASTE PROGRAM

Crystal," Dr. J. F. H. Custers, Diamond Research Laboratory; "The Selection, Division and Shaping of Diamonds for the Manufacture of Diamond Tipped Tools," R. G. Weavind, Diamond Research Laboratory; "Some Aspects of the Batch Production of Diamond Tools," N. R. Smith. L. M. Van Moppes & Sons Ltd.

9:30 a.m.
AUTOMATION
(Room B)

Punched card or tape control—two applications.

Speakers: "The Tool Engineer's Function in Numerical Control," J. Daugherty, Giddings & Lewis Machine Co.; "The Use of Punched Cards for Machine Control," J. J. Jaeger, Pratt-Whitney Co. Inc.

10:30 a.m.
MACHINE TOOLS

Should you rent or buy?

Speakers: "The Case for Buying Machine Tools," George Terborgh, Machinery & Allied Products Institute; "The Case for Renting Machine Tools," F. J. Trecker, Kearney & Trecker Corp.

1:30 p.m.
SHAPED DIAMOND TOOLS

Thread and form grinding.

Speakers: "Diamond Dressing of Form Grinding Wheels," Jack Bryant, Allis-Chalmers Mfg. Co.; "Shaped Tools for Form Grinding From the Manufacturers' View Point," J. B. Speirs, American Coldset Corp.; "Suggested Standards for Diamond Tool Shanks," Martin Hoerer, Golconda Corp.

2:30 p.m.
PLASTIC TOOLING

When, where, how and why should plastic tooling be used instead of metal tooling?

Speaker: "Advantages of Plastic Tooling," Fred Lyijynen, Auto Body Div., Chrysler Corp.

Interview Panel: John Mickey, Ford Motor Co.; Robert H. Voss, Warren Plastics & Engineering Inc.; E. R. Kalis, Fisher Body Division, GMC.

3:30 p.m.
THE PROFESSIONAL ENGINEER

How and why tool engineers should become registered professional engineers.

Speakers: "Why Register," Paul H. Robbins, National Society of Professional Engineers; "How to Become a Registered Professional Engineer," John D. Constance, Professional Engineer.

8:00 p.m.
RESEARCH
(Beverly Room, Conrad Hilton hotel)

A report on the mist application of cutting fluids. Machinability testing methods.

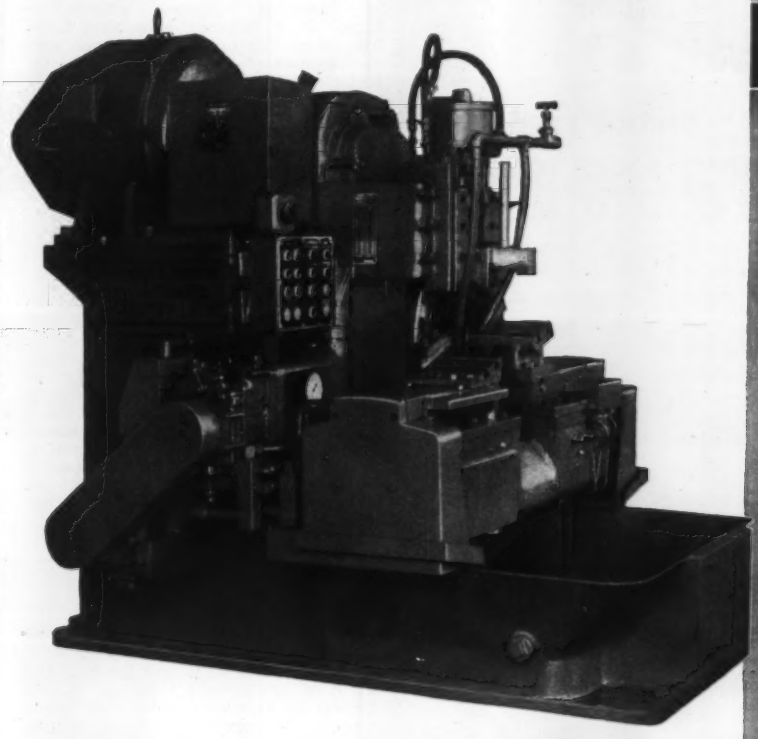
Speakers: "Methods of Applying Cutting Fluids," Profs. M. C. Shaw and

BARDONS & OLIVER

MILL TYPE CUTTING-OFF LATHES

✓ FULLY AUTOMATIC FOR COUPLING WORK

✓ SEMI-AUTOMATIC FOR CROPPING WORK



ADDITIONAL SIZES OF BARDONS & OLIVER CUTTING-OFF LATHES			
No. 32 —	Capacity from	¼″ dia.	to 2″ dia.
No. 33 —	″ ″	½″ dia.	to 3″ dia.
No. 34 —	″ ″	¾″ dia.	to 4″ dia.
No. 35 —	″ ″	1″ dia.	to 5-⅝″ dia.
No. 36 —	″ ″	1½″ dia.	to 6⅝″ dia.
No. 38 —	″ ″	2⅜″ dia.	to 8⅝″ dia.
No. 39 —	″ ″	2⅜″ dia.	to 9⅝″ dia.
No. 312 —	″ ″	4½″ dia.	to 12¾″ dia.
No. 316 —	″ ″	6⅝″ dia.	to 16″ dia.

We also manufacture a complete line of Turret Lathes

FEATURING

HIGHER SPEEDS AND GREATER POWER FOR INCREASED PRODUCTION

- Spindle speeds up to 300 R.P.M. with up to 30 H.P. motor
- More rugged, dependable double tool slides
- Increased chucking power

Optional Extras

- Automatic or semi-automatic outside and inside chamfering attachments
- Speed accelerating device for cutting off solid bars
- Automatic stock loading tables
- Automatic stock unloading tables

BARDONS & OLIVER, INC.

1147 WEST 9TH STREET • CLEVELAND 13, OHIO

ROLOCK

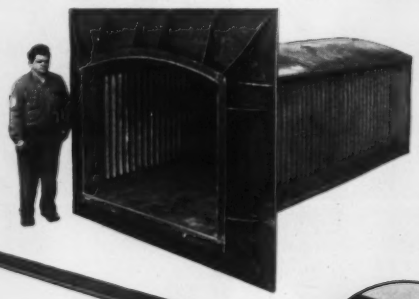
FABRICATED ALLOYS

HEAT AND CORROSION RESISTANT

Bright annealing Stainless strip in Drever furnace, 2050° F. Welded Inconel, corrugated in both arch and hearth.

UNIQUE EXPERIENCE AND FACILITIES SOLVE TOUGHEST MUFFLE AND RETORT PROBLEMS

Here are four examples from current production, each featuring unique Rolock fabricated welded design and construction . . . each assuring far longer service life, positive gas-tightness and stability at high temperatures. Rolock's wealth of experience and special skills are at your service. Quality standards maintained by the use of pressure testing, X-ray, penetrant die and other forms of inspection. Call or write for our new comprehensive catalog-data book.



Brazing aircraft wing assemblies in Hydrogen atmosphere, Holcroft furnace. Gas-tightness essential. Max. temp. 2150° F.

Elliptical form with single longitudinal weld. 6" wide, 2½" high x 17 feet. AGF furnace, annealing steel strip.

2700-lb. muffle, corrugated, welded fully annealed after fabrication. Rockwell furnace, continuous annealing at 1600° F.

SALES AND SERVICE REPRESENTATIVES FROM COAST TO COAST

ROLOCK INC., 1262 KINGS HIGHWAY, FAIRFIELD, CONN.

JOB-ENGINEERED for better work
Easier Operation, Lower Cost

IRL56

ASTE PROGRAM

P. A. Smith, Massachusetts Institute of Technology; "Metal-Cutting Evaluation," F. J. Daasch, Rock Island Arsenal Laboratory.

8:30 p.m.
CARBIDE DIES
(Waldorf Room, Conrad Hilton hotel)

What to tell the diemaker.

Speakers: "Machining Carbide Dies by the Electrical Discharge Method," J. K. Carroll, Electrosize Inc.; "How to Help the Die Builder Give You Satisfaction," H. Harig, Harig Mfg. Corp.; "What the Strip Steel Manufacturer Should Know," Burton E. Longwell, Republic Steel Corp.; "The Die Builder Asks for Help," Don E. Oberg, Oberg Mfg. Co.; "Application of Cemented Tungsten Carbide for Dies," P. F. Rehner, Allegheny Ludlum Steel Corp.; "The Stamper and Die Building," Thomas C. Roberts, Kobzy Tool Co.

Wednesday, Mar. 21

NEW PROCESSES

9:30 a.m.
SHAPED DIAMOND TOOLS
(Room A)

When to use diamond tools. How to improve turning, shaping, boring and reaming operations.

Speakers: "Use of Industrial Diamonds and Diamond Tools in Industry," D. J. Wallace, Wheel Trueing Tool Co.; "The Use of Diamond Tools for Turning and Shaping of Small Parts," L. A. Hurwitz, Hamilton Watch Co.; "Application of Diamond Tools to Turning, Boring and Reaming," Joseph Klipper, Clipper Diamond Tool Co.

9:30 a.m.
FINE PITCH GEARS
(Room B)

A complete summary of fine pitch gearing.

Speakers: "An Objective Look at the Field of Instrument Gearing," Louis D. Martin, Eastman Kodak Co.; "Gear Gaging Automation," T. S. Gates, National Broach & Machine Co.

10:30 a.m.
ELECTRONIC CALCULATORS

What they are—how they are built to help the tool engineer solve machinability problems.

Speakers: "Introducing Computers for Machine Tool Control," J. J. Stone, Battelle Memorial Institute; "The Machinability Computer," Dr. W. W. Gilbert, General Electric Co., and E. J. Weller, Carboloy Department, General Electric Co.

1:30 p.m.
SHAPED DIAMOND TOOLS

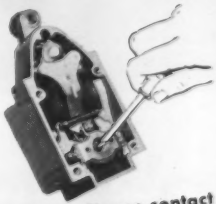
Special uses; selection of diamond powder tools and wheels; production grinding.

Speakers: "Cemented Particle Diamond Tools," Prof. C. Law McCabe, Carnegie Institute of Technology; "The Selection of Diamonds for Various Applications," Dr. G. P. Freeman,

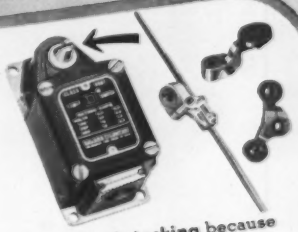
SQUARE D LIMIT SWITCHES

DESIGNED TO DO HUNDREDS OF JOBS... Better!

Instant visual inspection of mechanism through transparent plastic cover (optional). A tremendous time saver in multiple switch installations.



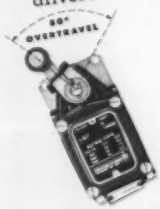
Eleven contact arrangements in one switch...and all you need to make the changes is a screwdriver!



Simplified stocking because basic switches and a wide variety of lever arms are packaged separately. Moderate stock handles a multitude of combinations.

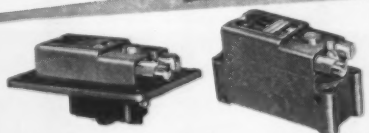
HEAVY DUTY

OIL-TIGHT • Class 9007, Type T

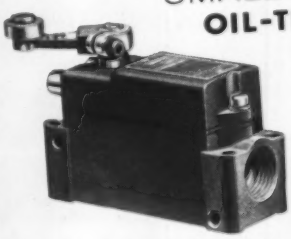


Continuously adjustable operating lever arms permit an infinite number of adjustments. Up to 80° overtravel reduces arm breakage.

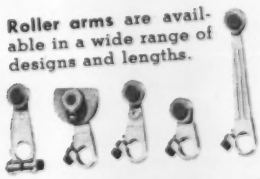
Easy mounting and interchangeability through wide variety of base plates and side mounting holes.



SMALL
OIL-TIGHT
Class 9007, Type A



Roller arms are available in a wide range of designs and lengths.



Small precision limit switch available in three forms—basic contact mechanism, flush or surface mounting. Both flush and surface mounting switches are available with varying lengths of roller arms and with rollers of different types and sizes. Also push rod operated (*shown above*) and in single unit or duplex construction.

Write **for Bulletin 9007** *which gives the complete details of Square D's complete line of oil-tight limit switches*

Address Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

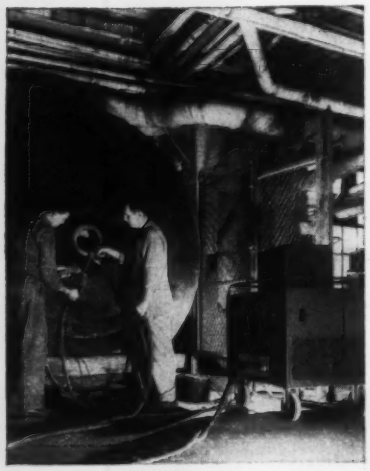
SQUARE D COMPANY

Using Invisible Light to Find Invisible Cracks

A Peoria, Illinois foundry uses Magnaglo and "black light" to make any possible cracks on castings show up as glowing indications. Detection of flaws in the "rough" state means no wasted time in finishing defective castings. Early detection also makes the cause of defects easier to spot and correct. Result? Consistent quality and lasting customer satisfaction.

Inspection Methods: Case Studies

Lower Overall Production Costs Through Nondestructive Testing



Spotting Trouble Before It Happens

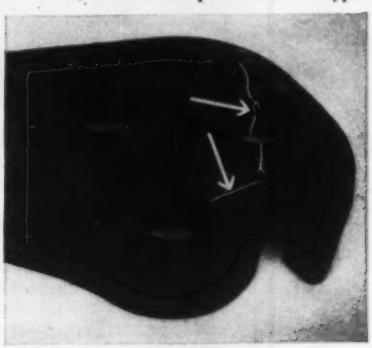
At the Bakelite Company plant in Bound Brook, N. J., inspecting reaction tanks is like seeing your dentist—should be done twice a year. A portable Magnaflux inspection unit is used to find cracked welds in tanks used in making the intermediate resins which go into Bakelite phenolic plastics.

Most manufacturers can achieve definite, worthwhile savings by employing one of the ⋈ methods for improved production control. These nondestructive inspection methods include: Magnaflux, for wet or dry magnetic particle inspection; Magnaglo, fluorescent particle inspection; Magnatest, eddy current electronic testing; Zyglo, fluorescent penetrant inspection; Spotcheck, dye penetrant inspection; and, Sonizon, for ultrasonic measurements.

The ⋈ testing methods are equally effective for preventative maintenance or manufacturing inspection.

Most manufactured products have as one, or more, of their components some type of casting, forging weldment, machined or formed part. Where cracks cannot be tolerated in the final product, maximum production economy must be obtained from the very outset. Flaws must be discovered as early as possible in order to eliminate further wasted effort in final processing or assembly.

Magnaflux methods pinpoint early flaws and help you eliminate their cause. This results in savings of time, labor and additional long range benefits from increased salvage and reduced amounts of scrap. For detailed information as to how one of the ⋈ inspection methods can help you produce better and save more, write or call for an interview with a Magnaflux engineer. No obligation, of course!



Heat Cracked the Jaw

The jaws of steel strapping machines must be reliable. Yet, following the heat treating, invisible cracks were discovered with Magnaglo as shown above. Immediate correction of the heat treat cycle eliminated the cracks. No further machine time or labor was expended on defective jaw parts.

Watching Your Weight

can be important—especially in the aircraft industry. Excess weight can reduce the range and payload of a plane. A major aircraft manufacturer uses ⋈ Sonizon units to ultrasonically measure thickness of sheet and formed shapes. This controls weight by eliminating excessive thickness.

MAGNAFLUX CORPORATION

Write for complete details concerning any of the above case studies, (excerpts from MAGNAFACTS), or ask for our new booklet on Lower Manufacturing Costs.

Take Your Inspection Problems to the House of Answers . . .

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ASTE PROGRAM

the firm, D. Drukker & Zn. N. V.; "Cutting of Glass, Ferrites, Carbide and Ceramics," Leon Van Geersdaele, Diamant Bort.

2:30 p.m.
TOLERANCES, JIG DESIGN

How to specify economical tolerances. Automation in jig and fixture design.

Speakers: "Impact of High Accuracy (Low Tolerance) Requirements on Jigs and Fixtures in Mass Production", A. V. Bodine, Bodine Corp.; "Automation—Its Effect on Jigs and Fixtures," H. Adams, Chrysler Corp.

3:30 p.m.
SURFACE FINISH

How to specify a finish and get it in production.

Speakers: "A Survey of Surface Finish Inspection Techniques," C. H. Good, Micrometrical Mfg. Co.; "Surface Finish and the Production Engineer," Dr. C. R. Lewis and A. L. Thomson, Chrysler Corp.

8:00 p.m.
AUTOMATION

Automation, small and large. Special attachments.

Speakers: "Automation for the Big Production Shop," Ralph E. Cross, Cross Co.; "Automated Electronics," J. B. Cunningham, Convair Div., General Dynamics Corp.

Thursday, Mar. 22

MANAGEMENT

9:30 a.m.

Fluid Power—Conference sponsored by the National Fluid Power Association.

10:30 a.m.
APPLYING RESEARCH

Application of metal cutting research.

Speakers: "Crater Wear of Cutting Tools," Profs. K. J. Trigger and B. T. Chao, University of Illinois; "Some Applications of Research Findings to Shop Problems," Prof. L. V. Colwell, University of Michigan.

1:30 p.m.
TRAINING AND DEVELOPING TOOL ENGINEERS

University and employer programs. The present engineer shortage.

Speakers: "The Training and Development of Tool Engineers," Prof. O. W. Boston, Department of Production Engineering, University of Michigan; "Industry Looks at the Engineering Shortage," T. C. Gleason, Chrysler Corp. Laboratories.

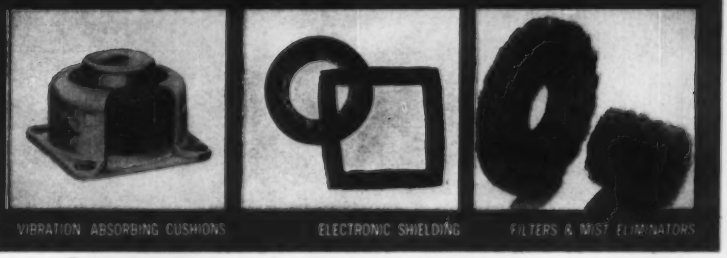
3:30 p.m.
PRODUCT, TOOL ANALYSIS

Cost reduction through product design analysis and tool control.

Speakers: "Product Changes Improve Manufacturability," L. D. Miles, General Electric Co.; "Control of Tool

Engineers have taken to **KNITTING** with **ALLOY WIRE...**

Look at the results they're getting...



If you haven't started to investigate the design potential for knitted stainless steel and nickel alloy wire, now is the time to do it. Here are some interesting applications to whet your interest and imagination:

1. VIBRATION & SHOCK ABSORBING CUSHIONS — used to protect intricate, expensive electronic equipment in aircraft. Alloy wire is unaffected by high temperatures, low temperatures, moisture and other elements.
2. ELECTRONIC SHIELDING — knitted alloy wire gaskets eliminate radio interference in electronic equipment. Nickel alloy wire has good conductivity, corrosion resistance and resiliency.
3. FILTERS & MIST ELIMINATORS — knitted wire pads remove entrained liquids from gas streams with exceptionally low pressure drop. Shaped cartridges widely used for oil and other liquid filters.

Many other industrial applications take advantage of the outstanding properties of knitted alloy wire. Learn more about these interesting products . . . send today for Application Bulletin A-1.

ALLOY HKP

ALLOY METAL WIRE DIVISION

H. K. PORTER COMPANY, INC.
Prospect Park, Pennsylvania

Built into your equipment

BIJUR

AUTOMATIC LUBRICATION ASSURES SATISFACTION

you benefit 5 ways

- Increase Production Capacity
- Save on Repair Bills
- Eliminate Costly Hand Oiling
- Reduce Downtime
- Lengthen Machine Life

WITH Bijur Automatic Lubrication as an integral part of your machines, you benefit from continuous peak production. Plant after plant reports increased out-put and greatly reduced maintenance costs with Bijur-equipped machines. Costly downtime for lubricating by hand is eliminated. Every bearing is metered the proper quantity of oil at predetermined intervals. Work spoilage and bearing troubles caused by over-lubrication are avoided. Fire hazards are reduced. Personnel accidents are prevented.

More than a million Bijur-protected machines are currently in use. Hundreds of leading manufacturers standardize on Bijur as "built-in" components of their machines. Bijur emphasizes custom engineering, and will gladly cooperate with your machine builder in designing a lubricating system to meet the specific requirements of the machines you order.

Bijur designed into your machines now automatically assures satisfaction. It makes sense . . . and dollars, too! Why not write today for literature and engineering information?

P-2

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LUBRICATING CORPORATION

Rochelle Park, New Jersey

Pioneers in Automatic Lubrication

ASTE PROGRAM

Costs Lowers Production Costs," E. Griffiths, Westinghouse Electric Corp.

Friday, Mar. 23

TOOL ENGINEERING

9:30 a.m.

DESIGN

Co-operation between designer, tool engineer, and inspection.

Speakers: "Measuring Productivity in Tool Design," Prof. A. F. Gould, Lehigh University; "Planning for Tomorrow's Gaging," Lewis O. Heinold, Federal Products Corp.

10:30 a.m.

STANDARDS

The Standards Committee proposes standards on carbide tool tips and tool steels.

Speakers: "ASTE-Recommended Carbide Tool Tip Standards," W. H. Seacord, International Harvester Co.; "The Need for Tool Steel Standards," Dr. G. A. Roberts, Vanadium Alloys Steel Co.

1:30 p.m.

TOOLING THE MONSTER PRESS

What problems have the world's largest presses brought to the tool engineer? Cast die possibilities.

Speakers: "Tooling Problems for Utilization of Large Hydraulic Presses," A. E. Favre, Aluminum Co. of America; "Tool Problems Peculiar to the Heavy Press Extrusion Industry," H. J. Ross, Kaiser Aluminum & Chemical Corp.

2:30 p.m.

LUBRICATION

Lubricants, their advantages and limitations. New lubricants.

Speakers: "Soluble Oils and the Tool Engineer," Dr. R. K. Gould and R. C. Givens, The Texas Co.; "Role of Cutting Fluids in Machining Operations," Dr. M. E. Merchant, Cincinnati Milling Machine Co.

PLANT VISITS

Busses for all morning tours leave the Conrad Hilton hotel at 8:30 a.m. and return to the International Amphitheatre. Afternoon busses leave the International Amphitheatre at 1:15 p.m. and return to the Conrad Hilton. **Registration is required.**

Monday, Mar. 19

1:15 p.m.

Tour No. 1, Motorola Inc. A modern plant with the latest in conveyors. Limited to 200.

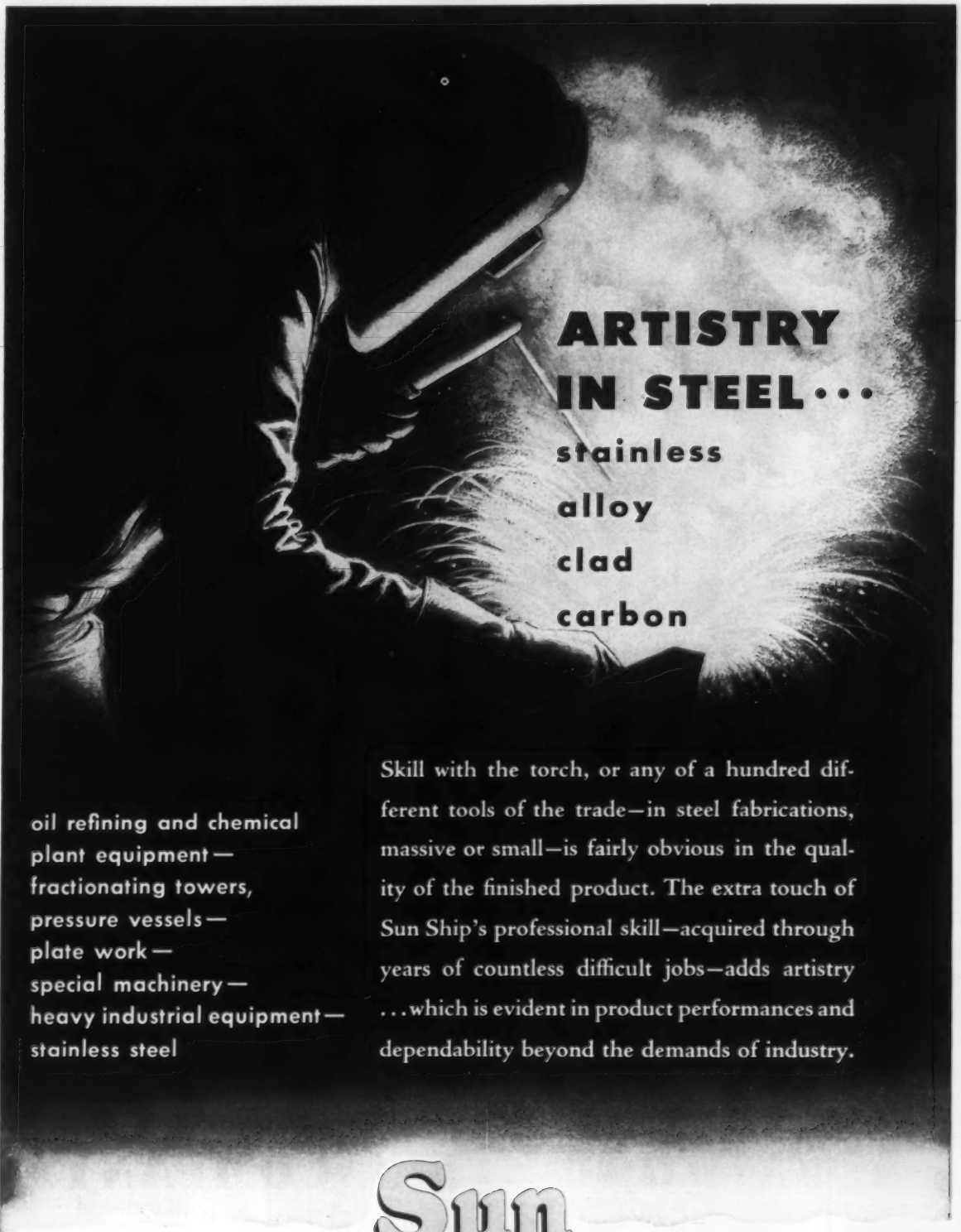
Tuesday, Mar. 20

8:30 a.m.

Tour No. 2, U. S. Steel Corp. Tour includes open hearth, bessemers, rolling, beam and alloy bar mills. Limited to 200; no cameras.

8:30 a.m.

Tour No. 3, Armour Research Foundation. See research work on high temperature abrasion, lubrication chemistry, railroad hot box problem,


ARTISTRY
IN STEEL...
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alloy
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carbon
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plant equipment—
fractionating towers,
pressure vessels—
plate work—
special machinery—
heavy industrial equipment—
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Skill with the torch, or any of a hundred different tools of the trade—in steel fabrications, massive or small—is fairly obvious in the quality of the finished product. The extra touch of Sun Ship's professional skill—acquired through years of countless difficult jobs—adds artistry ...which is evident in product performances and dependability beyond the demands of industry.

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IRON PRODUCTS
"Swede" Pig Iron

STEEL PRODUCTS
Plates (sheared)
A. W. Dynalloy (high strength steel)
Hot Rolled Sheets
Hot Rolled Strip
Cold Rolled Sheets
Cold Rolled Strip

ROLLED STEEL FLOOR PLATE
A. W. Algrip abrasive
A. W. Super-Diamond pattern

A. W. CUT NAILS
Standard & Hardened

MINE PRODUCTS
Iron Ore Concentrates
Iron Powder
Crushed Stone
Grit
Sand & Engine Sand

COKE
Foundry, Industrial & Metallurgical

COAL CHEMICALS
Ammonium Sulphate
Benzol
Toluol
Xylol
Naphthalene
Sodium Phenolate
Tar Bases (Pyridene)
Solvent Naphtha
Crude Still Residue

PENCO METAL PRODUCTS DIVISION
Steel Cabinets, Lockers & Shelving

customers...

Keeping customers, large and small . . . getting new customers and serving them—these sum up a substantial part of Alan Wood's success story. Alan Wood Steel does it through product dependability, service, competitive spirit and pioneering courage. As customer and industry needs change, Alan Wood keeps pace—or sets pace, as in the development of new or improved products. Behind it all is a guiding policy of planned growth that has helped Alan Wood Steel expand from a tiny shop in 1825 to a versatile, fully integrated steel mill that still provides individualized service and attention to its customers.

For detailed information on any Alan Wood Product, write Marketing Division Department AW-51.

ALAN WOOD STEEL COMPANY

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ASTE PROGRAM

new alloys and vibration tools. Limited to 50. Noncitizens must register in advance.

1:15 p.m.

Tour No. 4. (A repeat of Tour 3)

1:15 p.m.

Tour No. 5, Skil Corp. Featuring straight line production processes. An automatic washer for diecastings is the latest addition. Limited to 90.

Wednesday, Mar. 21

8:30 a.m.

Tour No. 6, Ford Motor Co. Largest manufacturing building under one roof (84 acres). J-56 and J-57 jet engine production. Limited to 100. Noncitizens must clear with the Air Force representative at the plant.

8:30 a.m.

Tour No. 7, Scully Jones & Co. Engineering Department, all phases of internal and OD grinding, lathes, screw machines, tapping and milling. Latest induction heat treating. Limited to 50. No cameras.

1:15 p.m.

Tour No. 8 (A repeat of Tour 7)

1:15 p.m.

Tour No. 9, Hotpoint Co. The manufacture of ranges, refrigerators and laundry machines. Some welders engineered and built by Hotpoint. Limited to 200. Noncitizens must have U. S. State department clearance.

Thursday, Mar. 22

8:30 a.m.

Tour No. 10, Kropp Forge Co. Said to be largest job forging shop in the U. S. Two 50,000-lb steam drop hammers; research metallurgical lab. Limited to 125. No cameras.

1:15 p.m.

Tour No. 11, International Harvester, Melrose Park Works. Machining operations for six types of diesel engines. Limited to 50. No cameras.

1:15 p.m.

Tour No. 12, Electromotive Division, General Motors Corp. Operations at the LaGrange plant—parts for diesel engines, diesel-electric subassemblies and final assembly of locomotives. Limited to 200.

1:15 p.m.

Tour No. 13, Sears, Roebuck & Co. Merchandising, testing and development labs. Tour shows tests and development work in progress. Limited to 50.

Friday, Mar. 23

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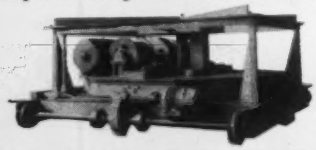

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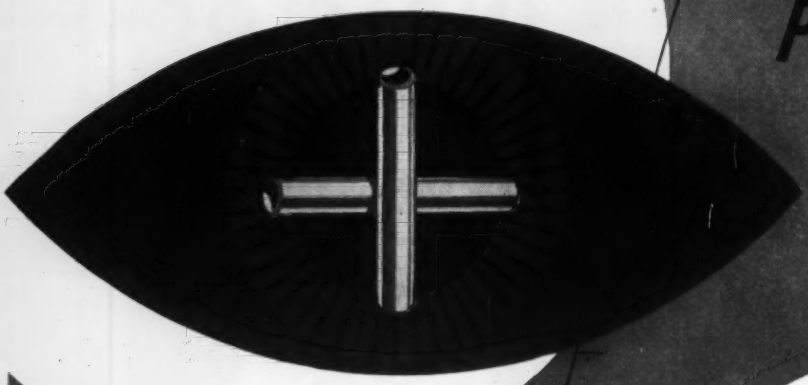

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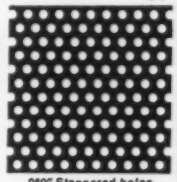

.060" Staggered holes. 126 holes per sq. in. 3/32" centers. 36% open.

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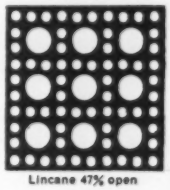

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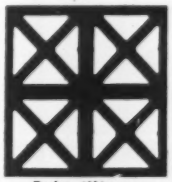

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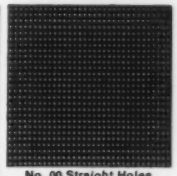

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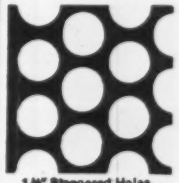

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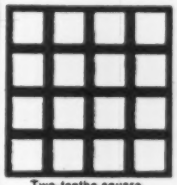

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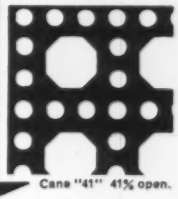

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plant wide protection from corrosion

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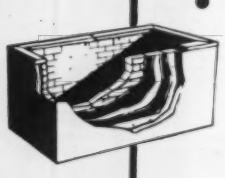

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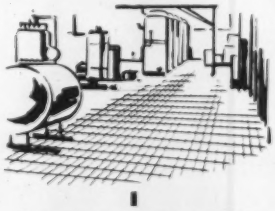

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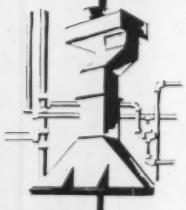

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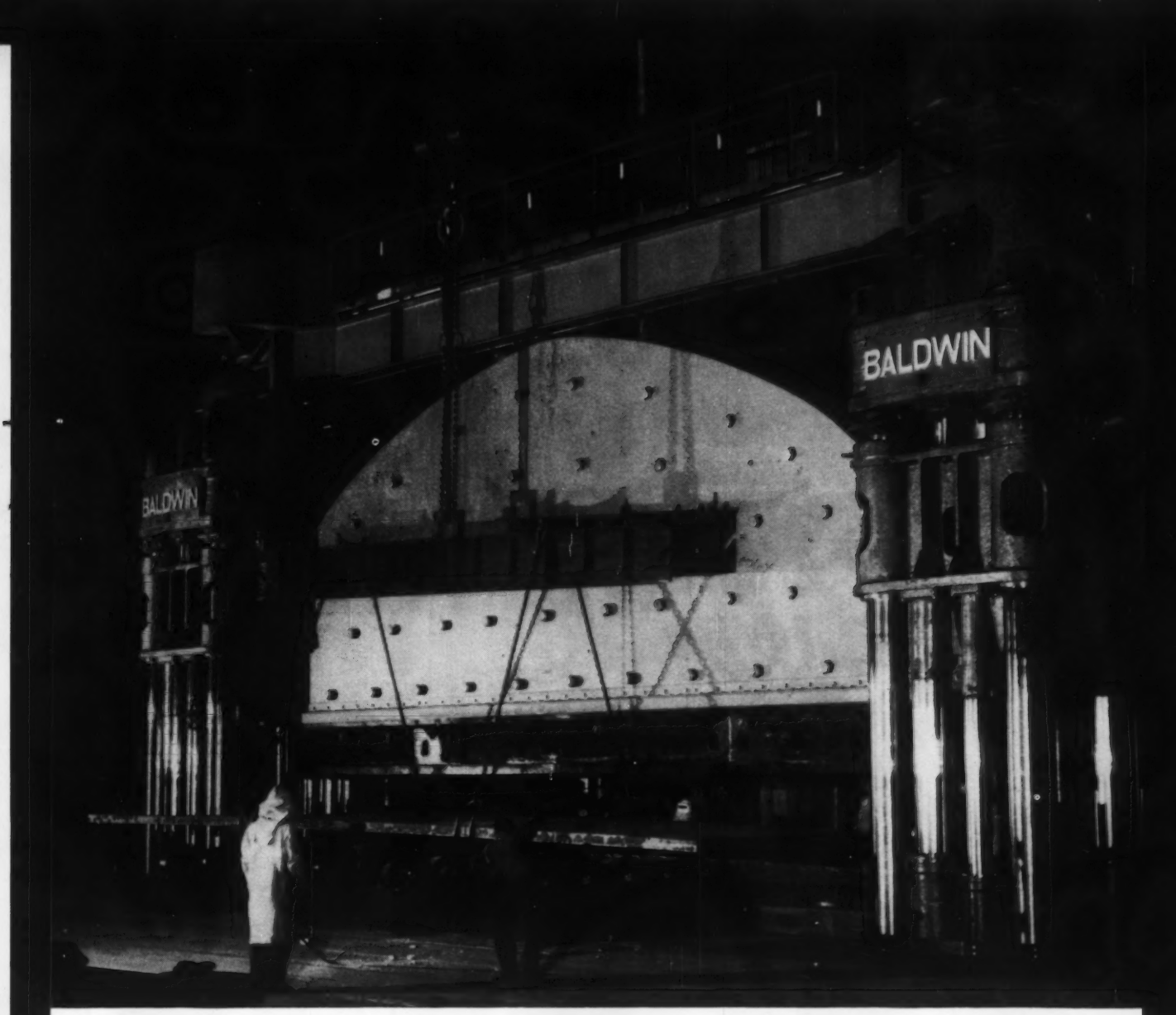

World's largest plate bending press built by Baldwin for Foster Wheeler

Now in operation at the Mountaintop, Pennsylvania plant of Foster Wheeler Corporation is an 8,000 ton Baldwin press that bends plate up to 7″ thick and up to 40′ long.

The largest machine of its kind ever built, this Baldwin press permits fabrication of bigger sections than ever before. The press is equipped with a built-in joggling device which allows one man alone at the control panel to move and position the plate for each bend. Approaching the work, the beam edge remains parallel with the bottom platen to within .030″ throughout its length. The beam can also be used in a tilted position for special work.

The engineering and fabrication skills that produced this huge press are always at your service to design and build all types of large metal-forming presses. Baldwin plate bending presses are built in sizes from 1,000 to 8,000 tons, and larger sizes can be built to order. Baldwin's complete line includes hydraulic presses for forging, forming, drawing, flanging and crimping, also mechanical presses and extrusion presses. Whatever your requirements, Baldwin can furnish the right press for the job. For our bulletin 3201 on metal working presses, write to BLH Corporation, Philadelphia 42, Pennsylvania.

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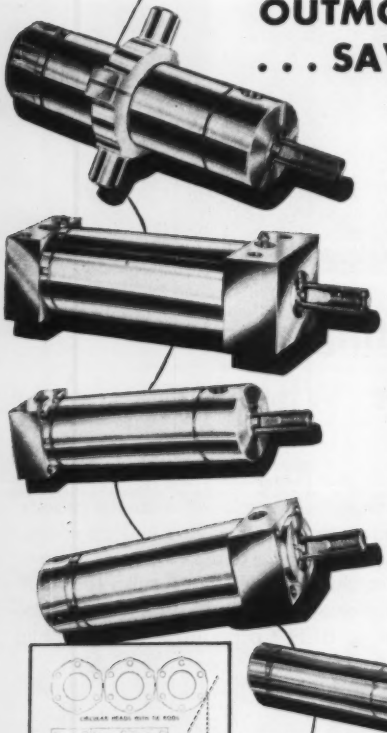

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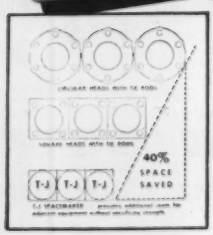

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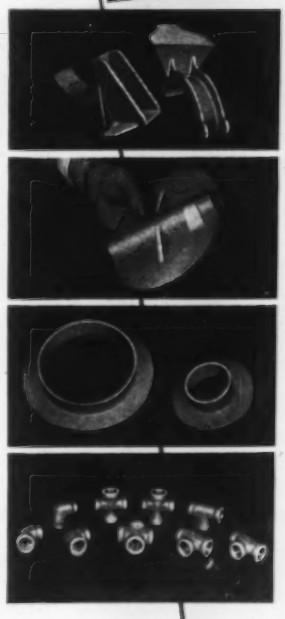

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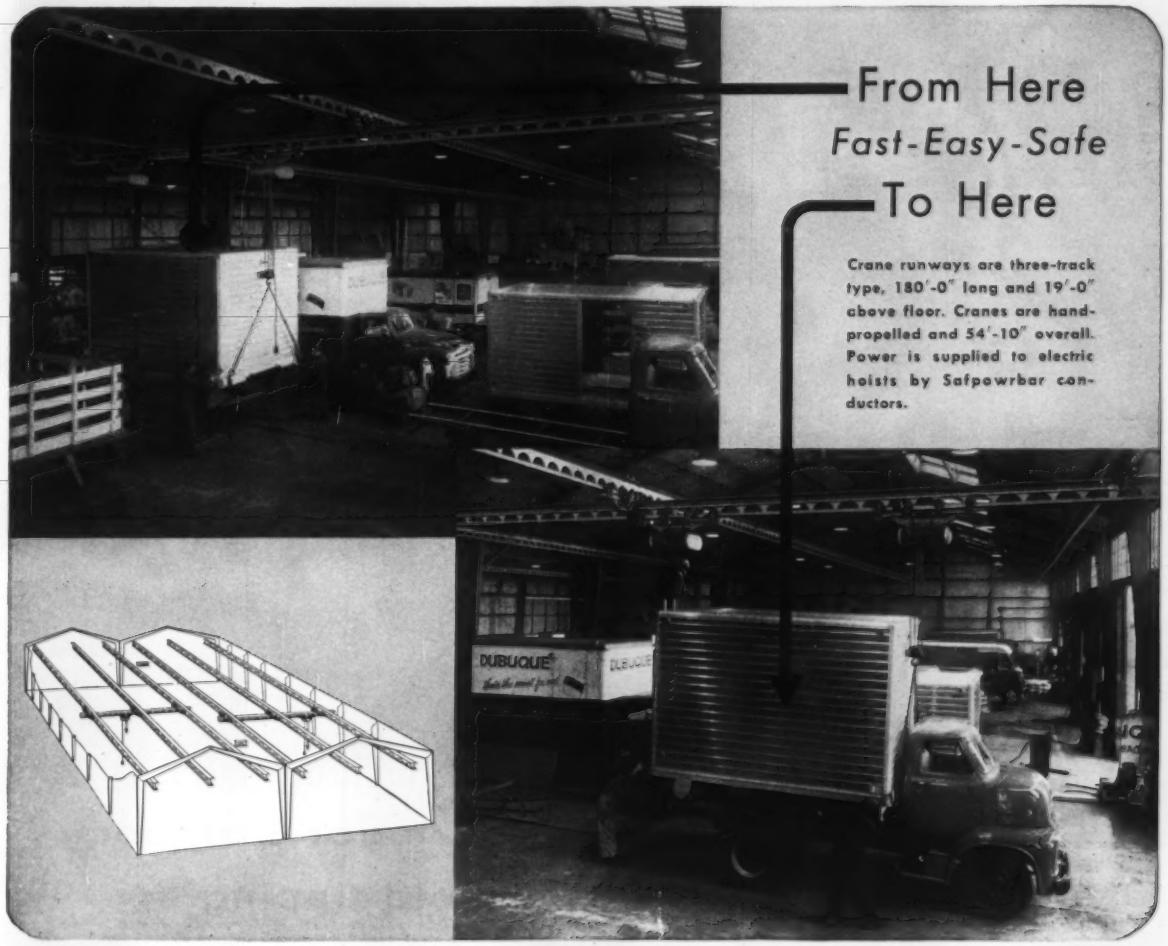
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Crane runways are three-track type, 180'-0" long and 19'-0" above floor. Cranes are hand-propelled and 54'-10" overall. Power is supplied to electric hoists by Safpowrbar conductors.
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TRUCK and trailer bodies are big, heavy and awkward to handle. It takes considerable time to move them from one point to another by ordinary means. With an overhead Cleveland Tramrail transfer crane system, however, the work is made simple, easy and fast.

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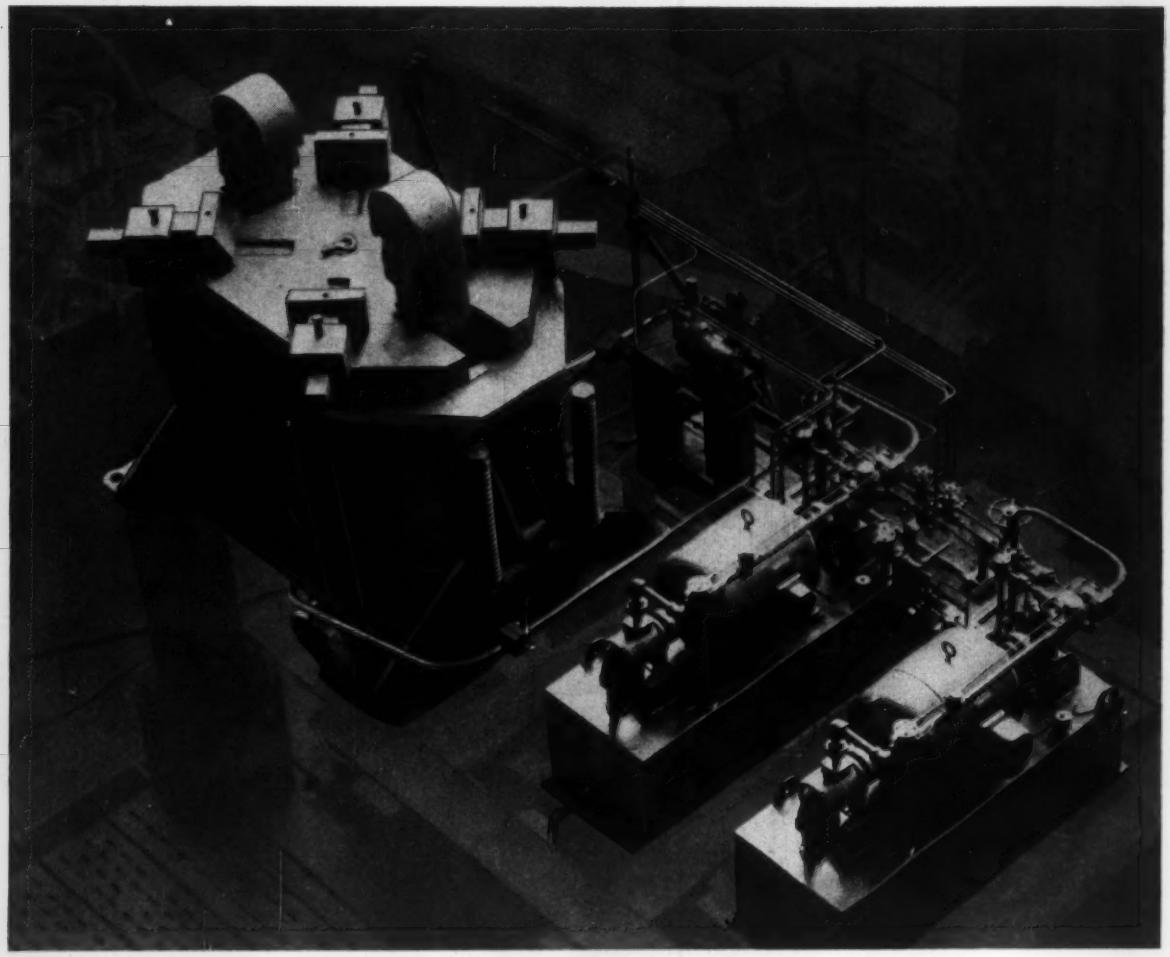

BIRDSBORO designs Ingot Stripper to lock firmly, prevent mold tipping

● Check the production and cost benefits of this new 800-ton capacity Birdsboro Ingot Stripper:

1. All operations controlled by a single manual valve.
2. Locking arms lock the mold firmly against the stripping plate.
3. Compensates for all irregularities in the stripping lugs on the mold.
4. Design prevents tipping of the mold and bending or breaking of the stripping pintle.
5. Full 18″ stripping stroke takes only 17 seconds.
6. Dual hydraulic system permits operation with one pump at half speed.

This same Birdsboro engineering ability can be applied to your operations to give more efficient production.

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BIRDSBORO

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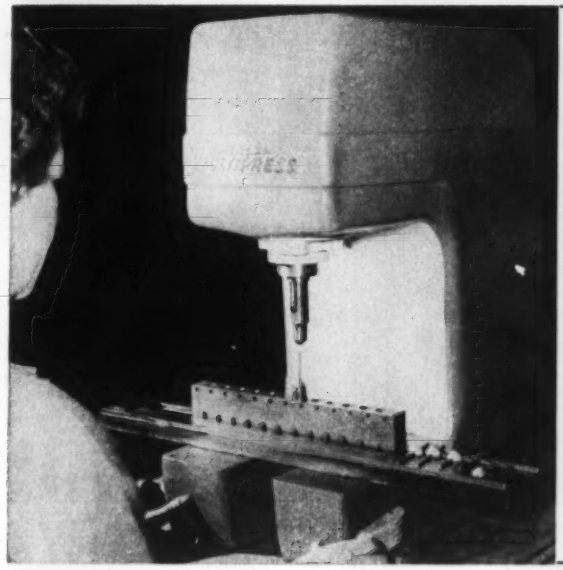
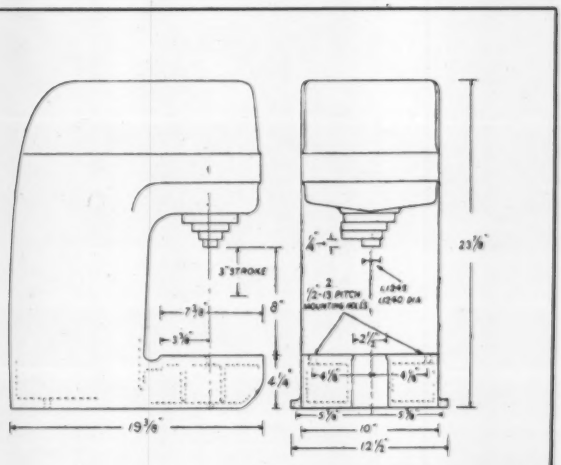
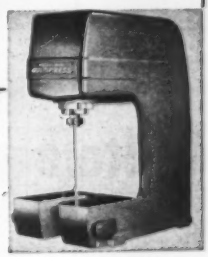






Press Has Ram Pressure of 500 to 2000 lb.

Versatility and simplicity of operation are offered by a new 1-ton press designed to fit the needs of users (as determined by a survey).

The press assembles, rivets, punches, marks, trims, makes pellets, tests, straightens, broaches, swages, etc.

Each stroke of the ram has the same pressure. The press has precision ram alignment and ample daylight to adapt tooling. It's easy to set up and cycle times are fast. Manual controls eliminate accidental tripping of the ram.

Flexibility—The press can be operated individually or in a production line; it fits into automated lines working with various types of feed mechanisms.

A ¾-hp motor powers the press. Its ram stroke is 3 in.

The hydraulic system is a single power unit that can be removed and replaced in a few minutes.

The press weighs 225 lb and is portable.

Case History—At Triad Metal Products Co., Cleveland, the press assembles a brass cone washer and a steel rod valve stem (see photo).

The washer is placed on a fixture of a slide feed workholder. A steel rod stem is inserted into the washer, and the two pieces are swaged together by the action of the ram.

Two buttons, one on each side of the press, must be pressed simultaneously to start the ram.

Up to 900 valves are made in an hour. The press allows the brass to flow into and around the punch, giving the desired fit to the needle valve.

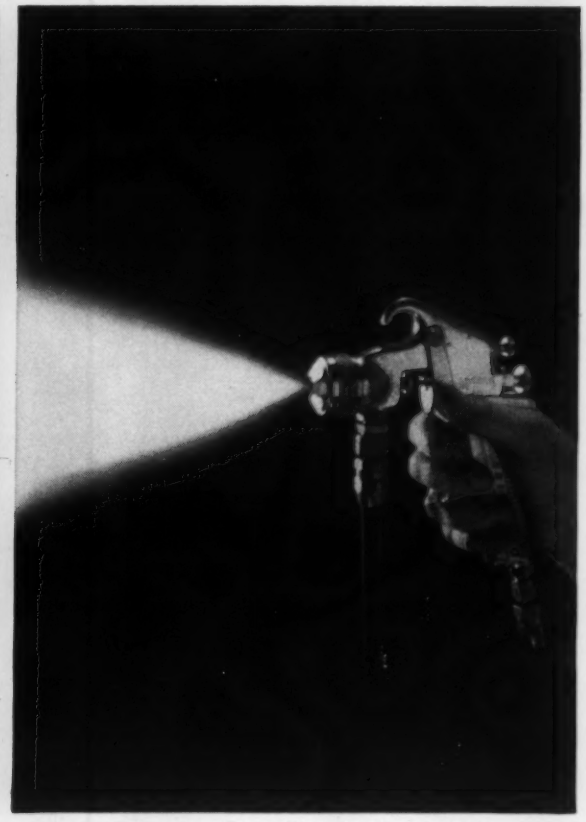
Triple Duty—Presses used by Lamson & Sessions Co., Cleveland, broach, strip and burnish fastener parts. Three presses have doubled production.

In broaching collar studs, parts are placed in the die and broached 3/16-in. deep by a special broach attached to the ram. Production rate is 1000 an hour.

Studs are stripped easily and quickly. The down stroke of the ram releases a spring holding the stripping plate built across the top of the ram. With the ram's up stroke, the plate falls, stripping the piece from the machine.

Maintenance—The oil level should be checked every two weeks. Hydraulic oil should be replaced every six months. A vane-type pump with two discharge ports provides oil for the high pressure supply to the

Paint sprayed cold often looks like this



Paint sprayed hot reduces fog, saves material

Telltale photos prove DeVilbiss cuts paint waste!

New Hot-Spray method creates less paint fog; saves up to 50% in material

By the application of controlled heat to the material – and spraying at far lower pressures – the new DeVilbiss Paint Heater solves the problem of spray fog, the major cause of spray-material waste. More paint reaches the surface; a heavier paint film can be attained with each application.

So, generally, one hot-sprayed coat covers better than *two or more* coats sprayed cold. Spraying time and material are often cut in half! And finishes? They dry faster, shrink less; come out glossier!

Usable for all types of products, the DeVilbiss Paint Heater can be *your* means to better finishing at lower cost. Call your DeVilbiss supplier, today, for an appraisal of your operation.

For full details, write for Folder F-286.

DeVilbiss Paint Heater permits Marinette Marine Corp., Marinette, Wisc., to effect multiple benefits in applying vinyl paints to U.S. Navy landing craft. Firm reports hot-spray system practically eliminates spray fog, objectionable fumes; allows heavier film build without sags; maintains trouble-free production rate.

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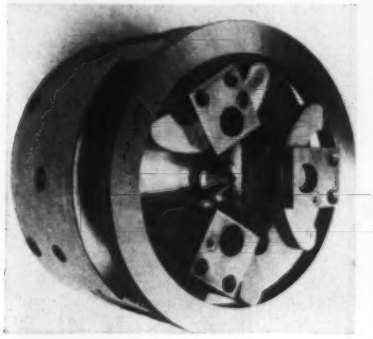
piston and the high speed phase of the cycle. *Write*: Denison Engineering Co., Columbus, O. *Phone*: Hudson 8-1191 (Tool Show Booth 1706)

Compensating Chuck

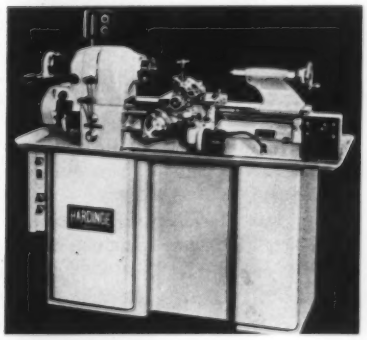
This tool has true equalization and is easy to change from one diameter to another. It operates with the machine running or stopped, allowing automatic loading and unloading.



The compensating mechanism increases the gripping power, permitting rapid stock removal. The center can easily be set dead true. The chuck can be used as a standard power chuck when needed. *Write*: Buck Tool Co., 2015 Schippers Lane, Kalamazoo, Mich. *Phone*: 2-0171 (Tool Show Booth 650)

Lathe

Pushbutton infinite speed control and an independent electric carriage and cross slide are combined in this toolroom and production lathe.



Spindle speeds (from 125 to 3000 rpm) are selected on a control box over the headstock. Carriage and cross slide feeds are controlled independently.

Speed and feed can be changed while the machine is running. *Write*: Hardinge Bros. Inc., 1420 College Ave., Elmira, N. Y. *Phone*: Elmira 6256 (Tool Show Booth 452)

Selective Heating

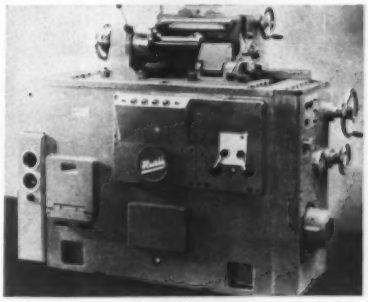
Machines for hardening, brazing and heat processing use automatic electronic control. Acetylene, butane, propane, natural or manufactured gas may be used.

Tools, fixtures and heating cycles are easy to set up and operate. Precise records of heating cycles can be made. *Write*: Cincinnati Milling Machine Co., Cincinnati 9, O. *Phone*: Redwood 2121 (Tool Show Booth 100)

Keyway Milling

This machine mills keyways and slots automatically. Only hand loading and unloading are required.

Milling time on a keyway $\frac{5}{8}$ x 2 x $\frac{1}{4}$-in. is about 1.09-minutes.

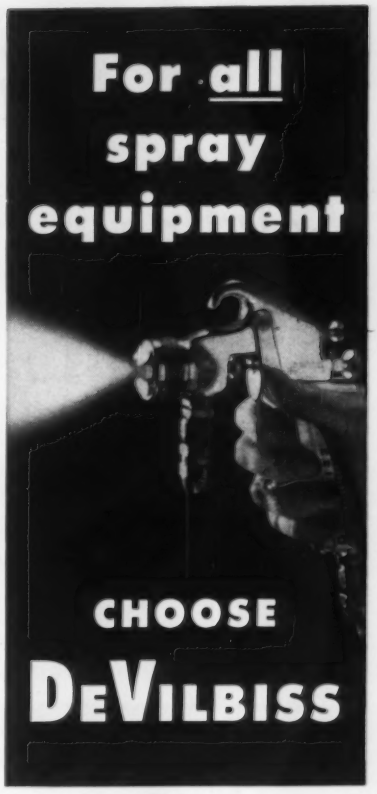


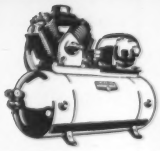
At the end of the cycle, the machine stops for the operator to change workpieces.

Large scales simplify setting the length, width and depth of slots. There are 12 spindle speeds. (180 to 2240 rpm) and 12 longitudinal feeds. Setup accuracy is 0.0002-in. *Write*: Kurt Orban Co. Inc., 34 Exchange Place, Jersey City 2, N. J. *Phone*: Henderson 5-3300 (Tool Show Booth 305)

Carbide-Tipped Drill

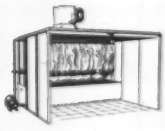
Here's a tool that drills precision holes in solid cast iron, aluminum, bronze and steel at feeds up to 60 ipm. In a single operation it produces holes with a tolerance of





Compressors – up to 22.6% more air per power dollar. ¼ through 15 hp.

Hose – air and fluid – specially fabricated for spray-painting use.



Spray Booths – full range of standard and specialized types.

Write for literature, or call your DeVilbiss supplier.

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FOR BETTER SERVICE, BUY DEVILBISS

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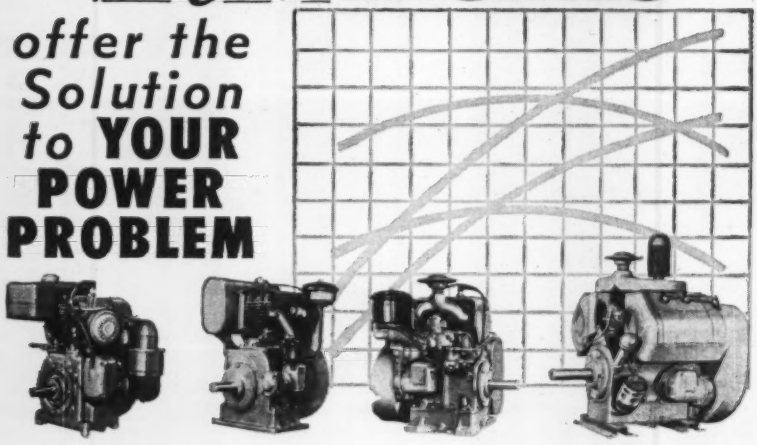
WISCONSIN Heavy-Duty *Air-Cooled* ENGINES

offer the Solution to YOUR POWER PROBLEM



Single cylinder 2.3 to 6.8 hp. | Single cylinder 6 to 9 hp. | 2-cylinder 7 to 15 hp. | V-type 4-cylinder 15 to 36 hp.

Next to the basic machine itself, one of your major problems, quite obviously, is to select and specify a power component that matches both the machine and the work it is to do... *most advantageously*. Wisconsin Heavy-Duty Air-Cooled Engines merit your critical and serious consideration because:

- Every Wisconsin Engine is of HEAVY-DUTY design and construction in all details... with the inbuilt stamina to *take it* under all operating conditions, in any climate, at all temperatures from extreme sub-zero to 140° F.
- The Wisconsin lines provide the most complete power selectivity to fit both the machine and the job... 12 different models in 4-cycle single cylinder, 2- and V-type 4-cylinder types, in a power range from 3 to 36 hp.
- Servicing of your equipment will be safeguarded by more than 2000 authorized Wisconsin Engine distributors and approved service stations in the United States and Canada.
- In world markets your Wisconsin-powered equipment will be supported by authorized Wisconsin Engine distributors and dealers in 82 countries, carrying service parts and replacement engines.

We will be glad to co-operate with you in adapting Wisconsin Heavy-Duty Air-Cooled Engines to your original equipment *most advantageously*. Tell us about your power problem. Specification bulletins and engineering data available on all Wisconsin Engines.

WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MILWAUKEE 46, WISCONSIN

A 8702-½-IAA

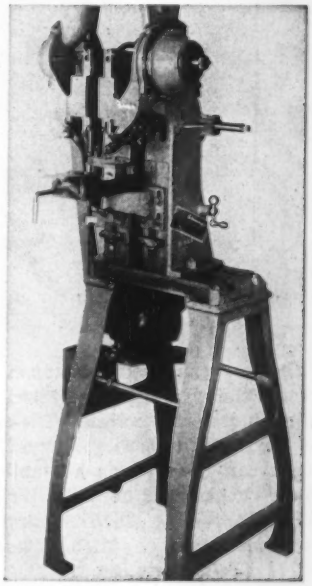
NEW PRODUCTS and equipment

0.0002-in. and surfaces as smooth as 4 rms at 15 ipm speed.

The drill has an off-center hole design that combines the advantages of an oil-flute drill and a trepanning tool. *Write*: Star Cutter Co., Farmington, Mich. *Phone*: Farmington 3195 (Tool Show Booth 1329)

Rivet Setter

This double setter has a special sliding fixture with solenoid control.



The pieces to be fastened are placed in riveting position on the fixture. Pushing the fixture forward trips a switch controlling the solenoid operating mechanism, causing two rivets to be set simultaneously. *Write*: Chicago Rivet & Machine Co., Bellwood, Ill. Phone: Columbus 1-1333 (Tool Show Booth 250)

Circular Table

A projection unit built into the 18-in. table is sealed from dust, oil and the heat of the lamp.

An optical micrometer breaks down the 10-minute divisions on the main glass circle into 200 parts. Direct readings are made to 3 seconds; estimates can be made to

Quality and service are the unseen ingredients in the steel that JESSOP makes

For 55 years in America and more than a century before that in England, the name Jessop has stood for high-quality specialty steels. This year with production at an all-time high and orders pouring in from good customers, new and old, one might assume that a company in Jessop's position would become complacent . . . would sit back and reap the harvest from former efforts, and rely on diplomacy to excuse slower deliveries.

Not so with Jessop. Jessop is a young and aggressive organization with a determination for absolute leadership. With business booming, Jessop is about to complete the first phase of an ambitious building program involving mills, furnaces, machines and, above all, good technical men. Jessop means to be sure that, as the tide of production rises, quality and service will not recede. Look at the list of products below. This is a good time to become a Jessop customer.

STAINLESS STEELS • HIGH SPEED STEELS • NON-MAGNETIC STEELS HIGH SPEED TOOL BITS • HEAT RESISTING STEELS • STAINLESS-CLAD PLATES • CARBON AND ALLOY STEELS • TOOL STEELS FOR SPECIAL PURPOSES • CAST-TO-SHAPE TOOL STEELS • HIGH SPEED AND ALLOY SAW STEELS • TEMPERED AND GROUND STRIP STEEL • COMPOSITE HIGH SPEED STEELS • STAINLESS AND HEAT RESISTING CASTINGS • COMPOSITE DIE STEEL SECTIONS • PRECISION GROUND FLAT STOCK • DIE STEELS—HOT AND COLD WORK

JESSOP

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Jessop Steel of Canada Limited, Wallaceburg, Toronto

Jessop Steel International Corp., Chrysler Building, New York, New York

NEW MONORAIL CRANE

offers many advantages

For up and over handling this new American MonoRail Crane offers you the following advantages:

- up to 10 ton capacity
- meets low headroom conditions
- extra store room
- carrier service beyond craneway
- fingertip control from floor
- all movement power operated
- low maintenance cost

These are but a few reasons why you should call an experienced MonoRail engineer to help you with your handling problems.

AMERICAN OVERHEAD HANDLING EQUIPMENT

MONORAIL COMPANY

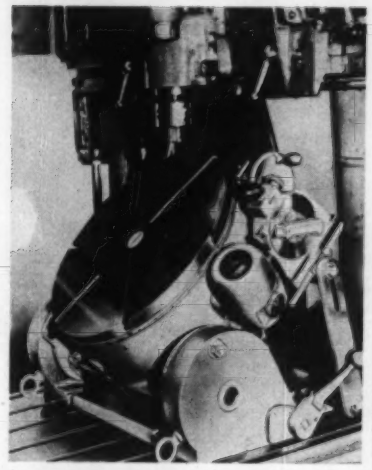
13102 ATHENS AVENUE • CLEVELAND 7, OHIO

[IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.]

"Up-and-Over" is the title of our 16-mm sound film showing how MonoRail solves many tough handling problems at low cost. Please allow us three weeks to schedule a showing for you.

Member
Materials Handling Institute - MonoRail Association

NEW PRODUCTS and equipment



1½-seconds.

The top surface of the table is flat and parallel to the base within 0.0003-in. *Write*: Engis Equipment Co., 431 S. Dearborn St., Chicago 5, Ill. *Phone*: Harrison 7-3223 (Tool Show Booth 1020)

Dial Indicators

A series of dial indicators has precision hardened gears and pinions. This makes the movement practically maintenance-proof and imparts increased sensitivity.

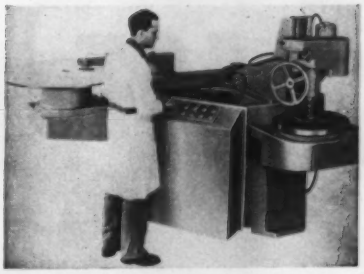
A center-type grinder control unit engages the work automatically while it is being ground. Size signals are sent to the gage control unit which controls the rate of wheel feed and retracts the wheel when finish size is reached. *Write*: Federal Products Corp., 1144 Eddy St., Providence 1, R. I. *Phone*: Stuart 1-9300 (Tool Show Booth 496)

Template and Cam Tool

This electronic unit generates external and internal contours on cams, templates, blanking punches and dies by following an enlarged conductive line drawing.

It reproduces contours from easily prepared drawings, eliminating much handwork and freeing the designer from the limitations of simple geometric contours.

A spindle speed range of 48 to 11,500 rpm permits fast carbide milling, milling of tough materials with large cutters and grinding operations. *Write*: Pratt & Whitney Co. Inc., West Hartford 1, Conn. *Phone*: Adams 3-7561 (Tool Show Booth 461)



Precision Tools

Brown & Sharpe is introducing some new tools, including a line of 47 dial gages with plain and jeweled bearings.

A height check has a rugged holding post with fine adjustment to accurately transfer precision settings.

A rolling mill caliper gage is drop forged to withstand severe use in measuring sheet iron and steel in rolling mills. The new

WEBB PLATE FABRICATING MACHINERY

Steelworkers ALL STEEL CONSTRUCTION

DELIVERY 10 DAYS

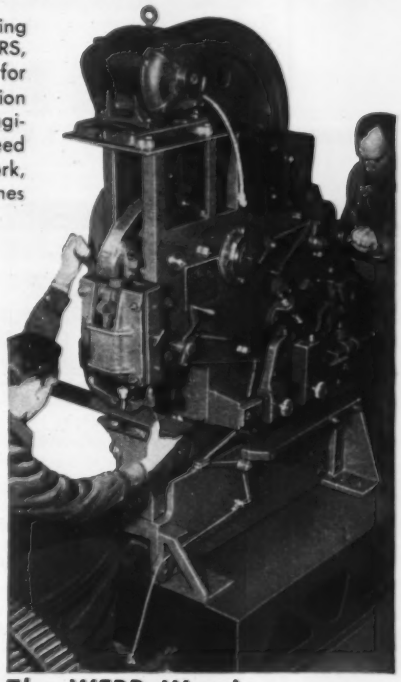
The Webb Corporation, in presenting the line of new WEBB STEELWORKERS, has designed versatile machines for either job-work or high production work. These units have been engineered to meet the particular need of shops having a variety of work, with a result that all-purpose machines are now available.

Five Complete Tools are Incorporated in a Single Unit.

1. Punch for plate, bars or structurals.
2. Cuts angles and tees with straight or miter cut.
3. Cuts off round and square bars.
4. Shears plates and bars.
5. Coping or notching attachment.

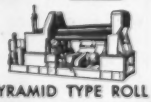
One of the main features of these machines is that they are at all times in complete readiness to do any of the above operations and to do the work well.

The punch may be operated at the same time as either the section cutter, bar cutter, shear or the coping and notching attachment . . . therefore, two operators can work at this machine simultaneously without interference. For illustrated literature and prices, write Dept. D.



Let Speed PAY-The WEBB Way!

SLIP ROLLS


PYRAMID TYPE ROLL

INITIAL TYPE ROLL

STEELWORKERS

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See our Booth #15 and #16 1956 Welding Show May 9, 10, 11—Buffalo, N. Y.

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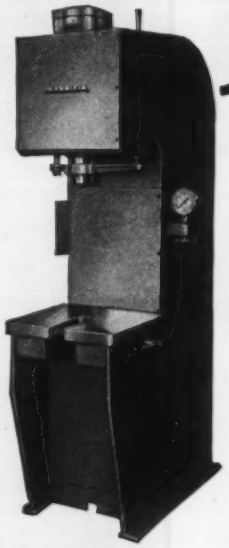
WEBB CITY, MO., U. S. A.

PRICE LIST

ON HANNIFIN STOCK HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,286
8-TON	$1,581
10-TON	$1,855
25-TON	$3,681

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

DELIVERY FROM STOCK

Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

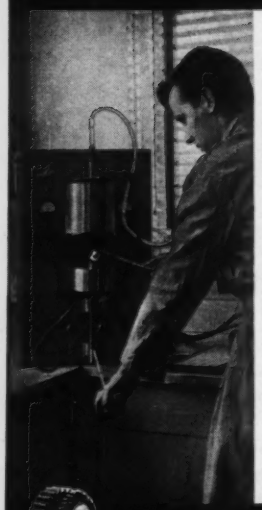
WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN

HANNIFIN CORPORATION, 523 S. WOLF ROAD, DES PLAINES, ILLINOIS

Another of the Reasons Behind Brad Foote Quality—

CARBON DETERMINATION



• In hardening gear teeth by carburizing, carbon content and depth of penetration are vitally important. BRAD FOOTE insures precise control of these factors through metallurgical tests with equipment developed specifically for this purpose.

• A test bar goes through the complete carburizing and heat-treating cycle with every batch of carburized gears. Shavings are taken from this bar at carefully measured depths. Chemical analysis of these shavings gives complete and precise data on carbon content and penetration.

• Carbon determination tests are only one of many metallurgical controls that insure the uniform quality of BRAD FOOTE Gears. Metallographic examination, hardness testing, chemical analysis—these are just a few of the quality checks provided by BRAD FOOTE's completely equipped metallurgical laboratories.

• Add these precise controls to specialized production and heat-treating equipment and a wealth of detailed experience in producing gears of all types—you begin to appreciate why BRAD FOOTE can produce better quality gears at substantial savings.

• Find out how BRAD FOOTE quality can save you money. Send us the specifications on your next job for quotation. No obligation of course. BRAD FOOTE MAKES ALL TYPES OF GEARS—IN A COMPLETE RANGE OF STYLES AND SIZES

BRAD FOOTE GEAR WORKS, INC.

1309 South Cicero Avenue • Cicero 50, Illinois
Bishop 2-1070 • OLympic 2-7700 • TWX CIC-2856-U

subsidiaries | AMERICAN GEAR & MFG. CO. Lemont, Illinois • Phone Lemont 920 | PITTSBURGH GEAR COMPANY Pittsburgh 25, Penn. • Phone SPalding 1-4600

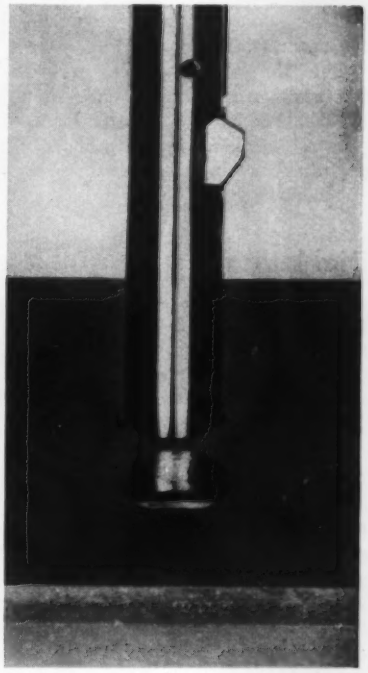
NEW PRODUCTS and equipment

universal vernier caliper measures outside, inside and depth in thousandths of an inch. *Write*: Brown & Sharpe Mfg. Co., Providence 1, R. I. *Phone*: Dexter 1-5000 (Tool Show Booth 374)

Deburring Tool

Deburring time is cut as much as 90 per cent. The tool works as well on lower surfaces as on upper ones.

The tool comes in sizes from ⅛ to 1 in. in diameter and turns at about 50 to 75 sfpm.

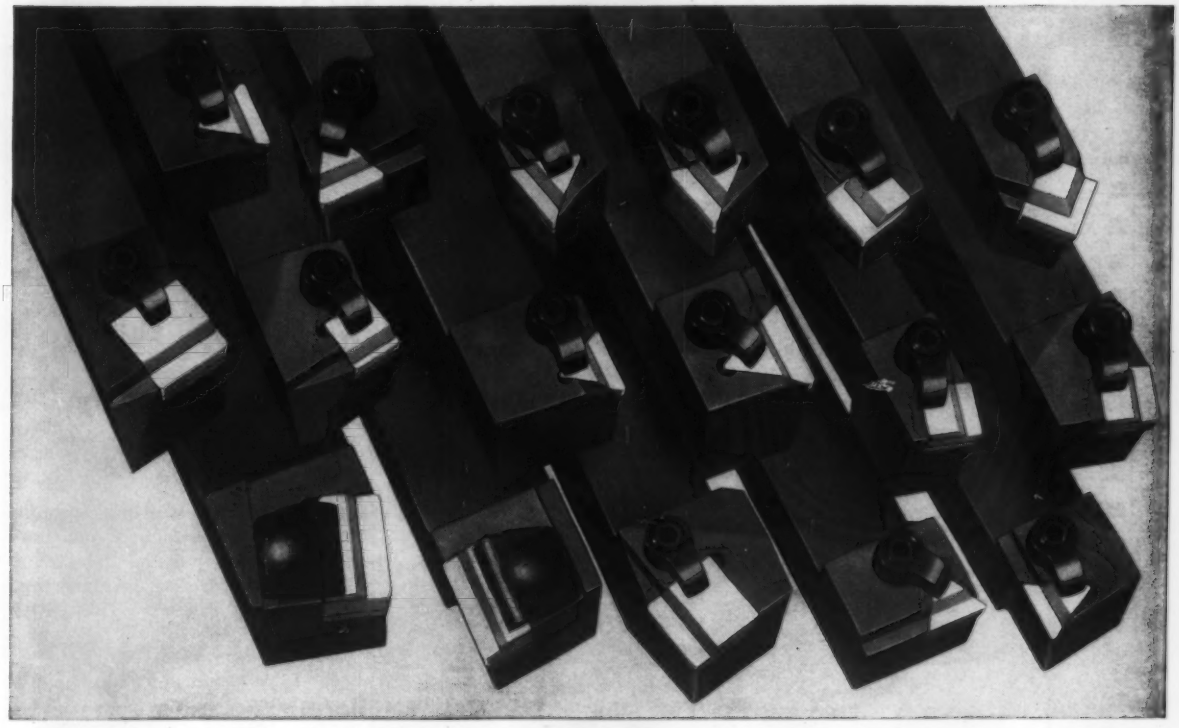


As the tool passes through a hole its blade first cuts, collapses, then cuts again on the return stroke. *Write*: Cogsdill Tool Products Inc., Oak Park, Mich. *Phone*: Lincoln 6-2700 (Tool Show Booth 185)

Double End Machine

These standard production units drill, tap and do other end-cutting tool operations. Spindle speeds from 190 to 10,000 rpm are available.

The machines have two drill units. Maximum stroke length per unit is 4 in.; maximum work ca-



17 Kendex† holder styles and 101 different tools

KENNAMETAL* today offers the tooling for tomorrow

Kendex Button and Heavy Duty tools can truly be considered as the "Tooling for Tomorrow."

Kendex holders are simple and rugged in construction; fitted with trouble-free, interchangeable "hardware"; accommodate square, round and triangular turnover, throw-away button inserts that eliminate costly grinding . . . all features needed to keep tomorrow's high speed, highly synchronized production lines on the go—hour after hour.

"Tooling for Tomorrow" must face up to varied cutting jobs, on many types of machines . . . machines that will require quick, accurate tool changing for close tolerance work at high speeds and low costs per piece. Kendex tooling was designed for such conditions. In addition, it increases efficiency; lowers tool investments; sharply reduces maintenance costs. There are over 100 Kendex tools and 35 different Kendex inserts—some stocked in as many as six Kennametal grades.

Why not have a Kennametal tool engineer help you step up efficiency on today's jobs with Kendex "tooling for tomorrow." He works exclusively with Kennametal tooling . . . applying and servicing it. This specialized experience is yours for the asking. KENNAMETAL INC., Latrobe, Pennsylvania.

Eleven Kennametal Grades . . . To Give You Top Performance

No matter how versatile or rugged the toolholder—final performance depends on the cutting edge. Here's where hard, uniform, dependable Kennametal blanks and inserts will pay off on your operations—regardless of the job or machine. With eleven grades to select from, you can get top performance on every cutting job.

Try Grade K21, the ideal general purpose steel cutting grade that is outperforming all other general purpose carbides, and its companion . . . Grade K5H . . . a hard crater-resistant grade for finish machining at high speeds. Kennametal's simplified grade selection system makes it easy to get the right grade on every job.

†Registered Trademark; Patent applied for
*Registered Trademark

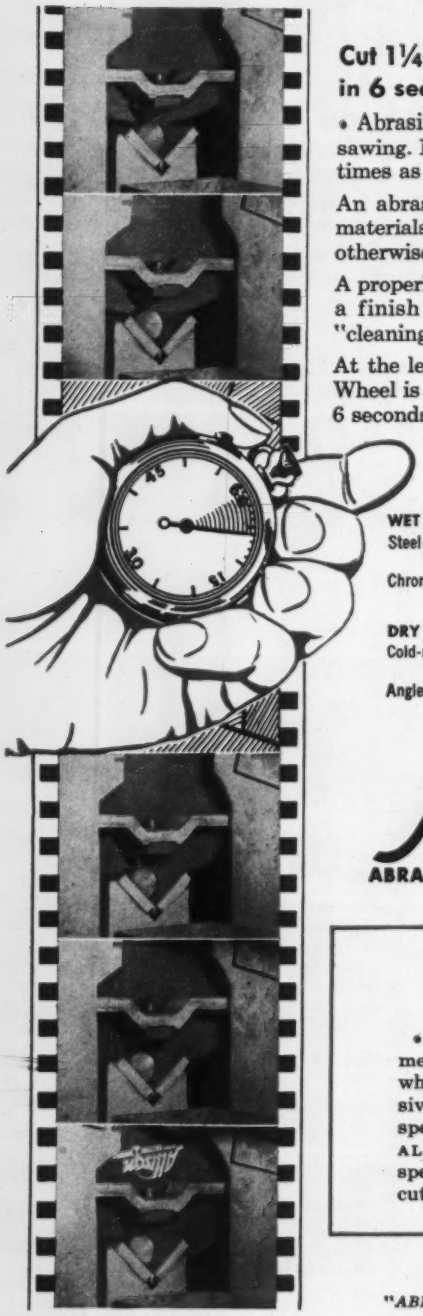
A-9435

INDUSTRY AND KENNAMETAL
...Partners in Progress

Abrasive Cutting

the best way to cut many materials
the only way to cut some

Allison Cut-Off Wheels



Cut 1¼" Bar Stock in 6 seconds

• Abrasive wheel cutting is faster than sawing. In many cases it is ten to twenty times as fast.

An abrasive wheel will cut the hardest materials with ease. No need to anneal or otherwise prepare material for cutting.

A properly selected abrasive wheel leaves a finish which requires little, if any, "cleaning-up" operation.

At the left an ALLISON Abrasive Cutting Wheel is shown cutting 1¼" bar stock in 6 seconds per cut.

HOW'S THIS FOR PERFORMANCE?

	Cutting Time
WET CUTTING	
Steel Bar.....8" dia... Rotary-type machine.....	320 seconds
Chrome Steel Bar.....4" dia... Oscillating-type machine..	105 seconds
DRY CUTTING	
Cold-rolled Steel Bar..1" dia... Chop Stroke-type machine..	2 seconds
Angle Iron.....1" x 1" x ⅛".. Chop Stroke-type machine..	2 seconds

Allison ABRASIVE CUTTING WHEELS

It pays to consult a specialist

• Profitable abrasive cutting means using the right abrasive wheel...and the proper abrasive cut-off machine...for the specific job. Why not let an ALLISON abrasive cutting specialist check your hardest cutting job?

Send for Booklet "ABRASIVE CUTTING" today

ACCO TRADE MARK

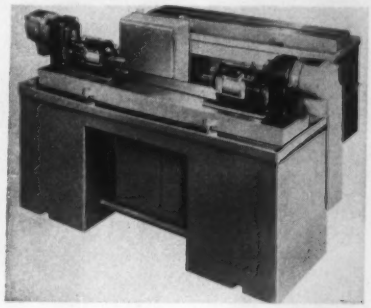
ALLISON DIVISION
AMERICAN CHAIN & CABLE

254-B Island Brook Avenue, Bridgeport 8, Conn.

NEW PRODUCTS and equipment

pacity is 2 hp. Rapid travel movements, feed rates and stroke lengths are adjustable.

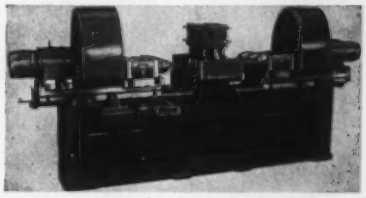
Holes can be machined that are opposed, offset, angular and up to



35 in. apart. Multiple spindle heads can be attached for machining several parallel holes at a time. *Write*: Hause Engineering, Montpelier, O. *Phone*: 5-3158 (Tool Show Booth 246)

Boring Machine

The hydraulic feed unit has six precision boring heads and a hydraulically clamped workholding fixture to hold six pistons. The



wristpin holes are semifinished and finished bored. Rated production: 375 pistons an hour. *Write*: Simplex Machine Tool Corp., 4548 W. Mitchell St., Milwaukee 46, Wis. *Phone*: Mitchell 5-2327 (Tool Show Booth 1612)

Hardness Tester

This Rockwell machine handles up to 1000 ferrous or nonferrous pieces an hour.

After testing, parts are routed to bins and classified hard, good and soft. A phototransistor circuit can be set to control the hardness limits as close as two Rockwell points.

The tester regulates the vertical travel of the elevating screw so that the device can test pieces of

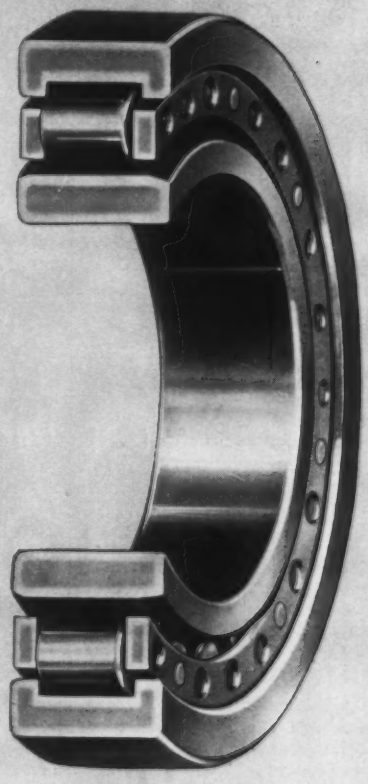
No job too little . . . or none too tough for BOWER STRAIGHT ROLLER BEARINGS

A complete line, a wide range of sizes to fit your specific needs

Square pegs weren't made for round holes. And aircraft bearings aren't built for farm equipment, either. That's why Bower designs a complete line of straight roller bearings—a line broad enough to meet any product requirement.

Jet planes break the sound barrier . . . need bearings that'll keep pace. So Bower aircraft bearings are engineered with exactness and precision to tolerances held to millionths of an inch. Bower tractor bearings, on the other hand, are built for ruggedness . . . to take heavy loads and real punishment, day after day, month after month.

Bower Roller Bearings are proved performers *in every field,* for *any* straight roller bearing application. From motors to earthmoving equipment, they're on the job—cutting maintenance and downtime, setting new standards of efficiency and economy. Get details on the *complete* line from a Bower engineer.



Tapered, Straight and Journal Roller Bearings for every field of transportation and industry

BOWER ROLLER BEARINGS

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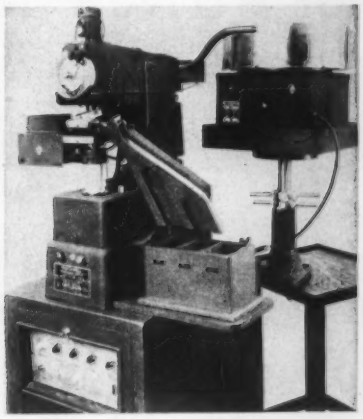
Joliet washers

world's foremost producer of flat washers

JOLIET WROUGHT WASHER CO. • JOLIET, ILLINOIS

NEW PRODUCTS and equipment



varying diameters and thicknesses automatically. *Write*: Wilson Mechanical Instrument Division, American Chain & Cable Co. Inc., 929 Connecticut Ave., New York, N. Y. *Phone*: Murray Hill 6-8800 (Tool Show Booth 909)

Power Saw

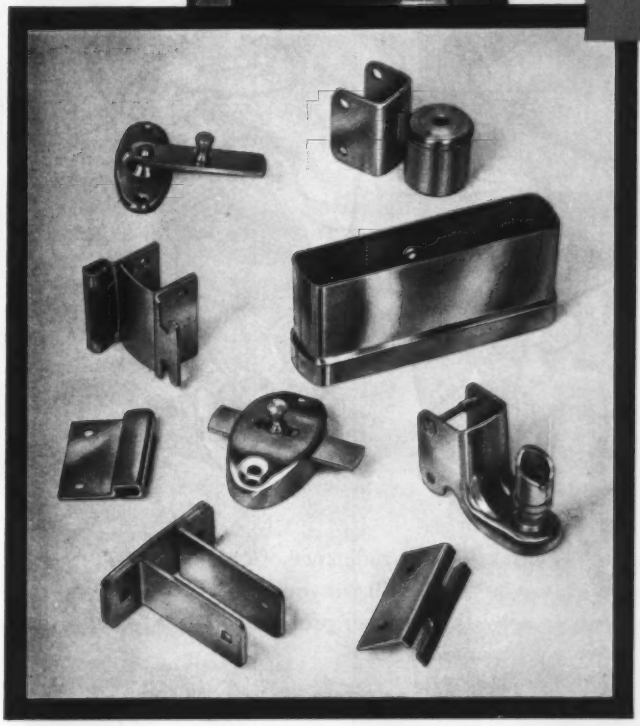
A high-speed-steel saw band is used with a companion cutoff machine.

The unit has automatic feed pressure control, automatic band tensioning, automatic indexing and infinitely variable speed control. *Write*: DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. *Phone*: Vanderbilt 4-1122 (Tool Show Booth 1520)

Vapor Blast Cleaning

Toolrooms and small machine shops can use this machine for vapor blast liquid honing, a process using a controlled solution of

Where Hardware Gets HARD WEAR...



Photos, courtesy Ferrometal Division, Milwaukee Stamping Co., Milwaukee, Wisc.

Stainless Steel from the HOUSE OF STAINLESS Does a Better Job at Lower Cost for Ferrometal Partitions

THE NEED—The hardware on toilet and other sanitary partitions in industrial plants, institutions and other public places is subject to extremely hard usage. Ferrometal found that the plated material used in producing their hardware was not measuring up to their high standards. The many parts involved showed the effects of corrosion too soon, and the moving parts did not stand up under constant use, necessitating costly replacements.

THE ANSWER—At the suggestion of the CSS representative serving this account, Ferrometal engineers turned to stainless steel for the solution. In the 18-8 type, they found just the material that would give them the corrosion resistance, strength and long wear required. But the advantages obtained did not stop here. The greater strength inherent in stainless steel permitted use of a lighter gauge with substantial savings. Moreover, new-die expense was held to a minimum because they were able to utilize most of their dies with modifications. And, with the change-over to stainless, all parts are now produced in their own plant to give them complete production control.

Perhaps the right stainless steel can do a better job at lower cost in your production picture, too.

The House of Stainless is always ready to give you the benefit of wide experience in exploring the possibilities of stainless steel for you. This service is backed up by comprehensive warehouse stocks and direct mill shipments through our mill placement department.

Just phone LAfayette 3-7210

CHICAGO STEEL SERVICE COMPANY

Kildare Avenue at 43th St., Chicago 32, Ill.

Mailing Address: P. O. Box 6308, Chicago 80, Ill.

Milwaukee District Office: 707 N. Broadway, Milwaukee 2, Wisc. • Telephone BRoadway 3-7874

Sales Representatives at Bloomington and Rockford, Illinois; Indianapolis and South Bend, Indiana; Cedar Rapids and Davenport, Iowa; Grand Rapids, Michigan; Minneapolis, Minnesota; Appleton, Wisconsin.

The House of Stainless

STEEL AT YOUR SERVICE

STELLE

Don't call NAMES—
Call "ELL" & "ESS"!

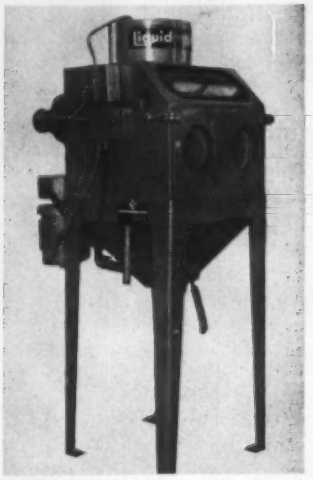
Down, boys, down. There's a better way to settle that difference of opinion.
Call "Ell" & "Ess"—Lamson & Sessions, to you—and we'll tell you
the best, most economical way to solve that fastener problem.
When it comes to bolts and nuts, we've got the answers. Our
files are bursting with "how to fasten it" data . . . and
we're bursting to share it with you.
So before you get hot under the collar, get hot on the phone . . .
and call in those helpful fastener fellows "Ell" & "Ess".
It will save time, trouble and tempers!
And remember, there's no charge for "Ell" & "Ess" service. It's yours for the asking.

The LAMSON & SESSIONS Co.

1971 West 85th Street • Cleveland 2, Ohio
PLANTS AT CLEVELAND AND KENT, OHIO • BIRMINGHAM • CHICAGO

abrasive, air, water and rust inhibitors.

It blends grind lines, improves oil retention, removes small burrs,



removes carbons and varnish and can add a matte finish. *Write*: Vapor Blast Mfg. Co., 3025 W. Atkinson Ave., Milwaukee, Wis. *Phone*: Custer 3-6500 (Tool Show Booth 218)

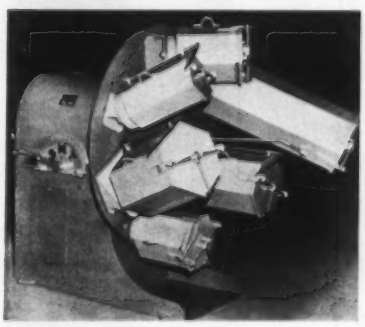
Steel Hardening Furnace

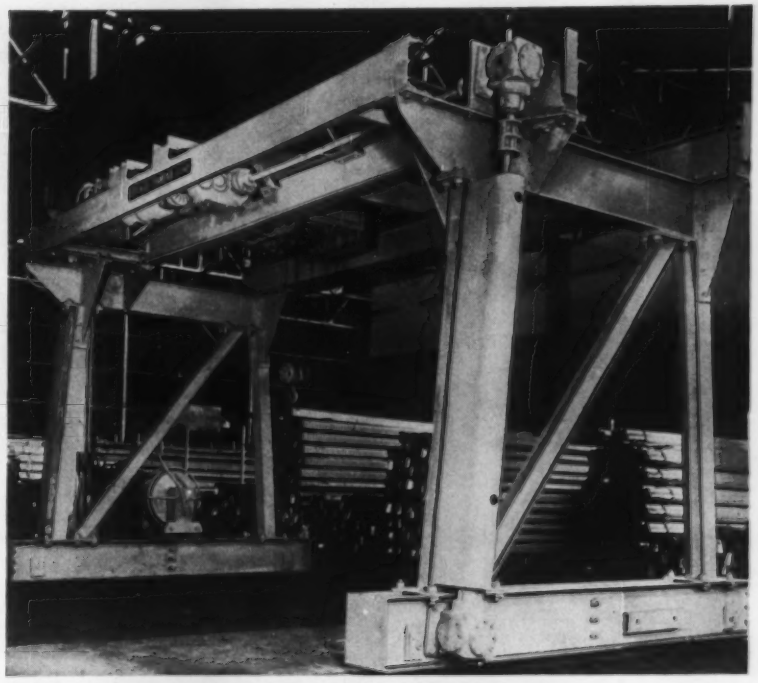
The electric, high-speed unit uses a diamond block method of atmospheric control to prevent scaling and decarburization. *Write*: Sentry Co., Foxboro, Mass. *Phone*: 330 (Tool Show Booth 284)

Barrel Finishing

Controlled-motion honing does not affect dimensions, yet it removes burrs, flash, tool marks, rust, paint, plating and heat treating scale.

Rounding corners, cleaning fillets and blending chamfers also can





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GANTRY CRANES

At the modern plant of one of the country's largest aluminum companies, Chicago Tramrail Gantry Cranes handle long extruded pieces from a 14,000-ton extrusion press . . . transfer these pieces to other operations throughout the mill.

Fourteen Chicago Tramrail Full Gantry Cranes provide individual handling equipment for individual operations to eliminate waste time waiting for busy overhead cranes. Designed for heavy-duty, continuous service, these Gantries are built with maximum headroom and maximum clearance between legs to operate independently under the large overhead cranes.

For a practical, economical solution to your materials handling problems, see our experienced engineers. Special designs, sound engineering and broad application knowledge qualify us for helpful service.

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OVERHEAD CRANES • JIB CRANES • STACKER CRANES • MONORAIL SYSTEMS

A call to any one of our seven warehouses will get you speedy service on your order . . . whether it's for ***alloy steel bars, billets or forgings,*** in any size, shape or treatment you need.

All seven warehouses are located in principal industrial areas. Each is modern and well-stocked, and staffed by expert metallurgists.

Call now if you need our own HY-TEN steels — "the standard steels of tomorrow", or standard AISI or SAE grades.

Or write for *free* copies of Wheelock, Lovejoy Data Sheets. They contain complete technical information on grades, applications, physical properties, tests, heat treating, etc.

In Canada: Sanderson-Newbould, Ltd., Montreal and Toronto

WHEELOCK, LOVEJOY & COMPANY, INC.

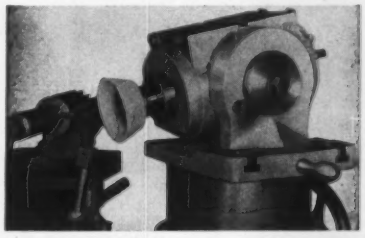
131 Sidney Street, Cambridge 39, Massachusetts

NEW PRODUCTS and equipment

be done on a variety of workpieces at the same time. Up to 25 barrels can be mounted on the unit in a variety of mountings, barrel sizes, linings and shapes. *Write*: BMT Mfg. Corp., 110-112 E. Ninth St., Elmira, N. Y. *Phone*: Elmira 7388 (Tool Show Booth 709)

Grinder Spindle

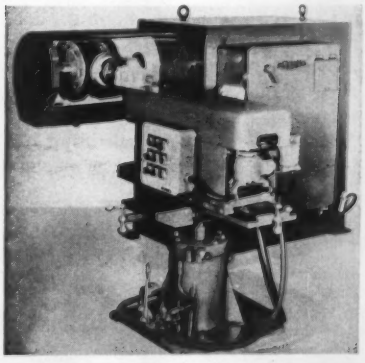
This tool and cutter component has angular adjustment in a vertical plane. A 1-hp motor gives 3600 rpm.



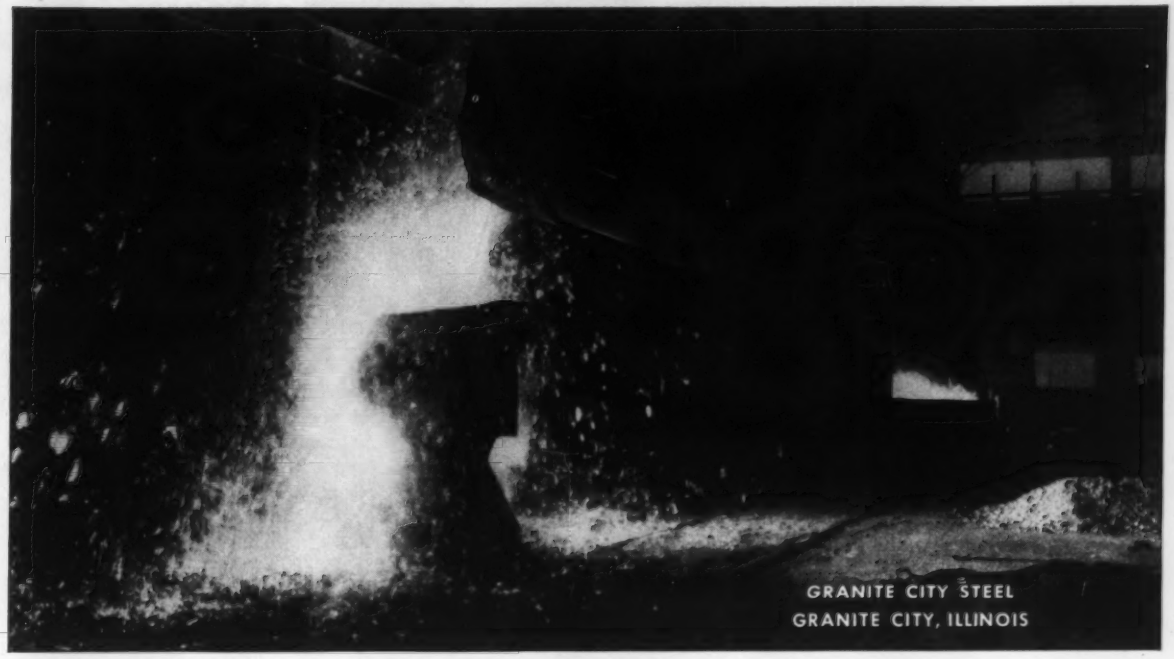
A double row of cylindrical roller bearings and separate thrust bearings prevent endwise movement of the shaft. *Write*: Pope Machinery Corp., Haverhill, Mass. *Phone*: Drake 5-5678 (Tool Show Booth 392)

Brushing Machine

This semiautomatic unit does gear deburring and other finishing jobs. The operator merely loads and unloads the workholding fixture.



Feeding and retraction of the workholder and rotation of the brushes are controlled automatically on a preset time cycle. Brushing blends tool and grinding marks



Granite City saves fuel, raises production and quality with Cities Service Heat Prover!

Nation's 14th largest steel producer uses Heat Prover on soaking pits, open hearth furnaces and on their annealing furnaces.

Granite City Steel burns enough fuel in one year to heat a five-room house for 38,000 years!

Obviously, if this fuel burns inefficiently, the loss could be staggering. But Granite City has no worries on that score. "Thanks to the portable Cities Service Heat Prover, we get better fuel efficiency, better quality, greater production than ever," they report.

"Because it provides a quick, highly accurate check of fuel-air ratio, the Heat Prover has proved invaluable in controlling combustion conditions in open hearth furnaces, soaking pits, and annealing and normalizing furnaces. In a matter of seconds it tells our engineers how efficiently the furnaces are working—whereas former tests often took hours and didn't provide as accurate a picture. Anyone in this business can probably benefit from this ingenious device."

Supplied and maintained free by Cities Service, the remarkable Heat Prover is today used and applauded by scores of major steel producers. If you'd like to learn how it could simplify your operation as it has theirs, talk with your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

20TH CENTURY BLOWGUN—a bazooka—is readied by technicians for tapping open hearths. They are part of Granite City's 4800 skilled employees.

HEAT PROVER AT WORK at back of open hearth furnace. In minutes it provides accurate check on furnace efficiency—saves hours required by former testing.

CONTROL TOWER at blooming mill guides ingots as they pass through rollers. Granite City has capacity of 1,200,000 net tons of ingots annually.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

SAVES ON EVERY LIFTING JOB

On the roughest, toughest heavy-duty cycle — or ordinary lifting jobs — the Series "700" 'Load Lifter' Electric Hoist gives you the best in load-handling performance and safety. It is a smooth-operating hoist, engineered to lift *fast* at the push of a button. In 2 seconds, a 1-ton load can be lifted a foot! It was the first hoist to have safe 24 volts at the pendant push-button.

Get new speed and cost-cutting power into your load handling with the Series "700" 'Load Lifter' Electric Hoist. Rarely needs maintenance, even under the most adverse operating conditions. Can be serviced *in the air*. Capacities up to 15 tons. Single and two-speed models. All types of suspension. Check with your "Shaw-Box" Distributor for details or write us for Bulletin 410.

MAXWELL MANNING & MOORE INC. M&M TRADE MARK

'Load Lifter'® ELECTRIC HOISTS

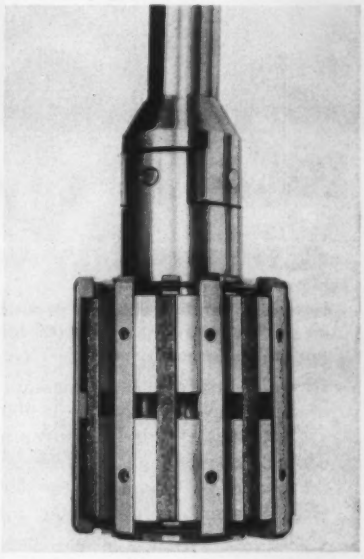
MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

and helps reduce the number of potential crack-starting points. *Write*: Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, O. *Phone*: Endicott 1-1900 (Tool Show Booth 466)

Honing Tools

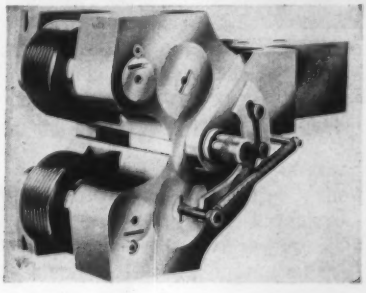
Abrasive stones are supported on their sides by the body of the tool. The use of a high percentage of the full depth of the honing stone is possible with this design. The side support is stationary, and the expansion support moves as the stone is used.



Protective material covers the sides of the stone to prevent spalling. *Write*: Barnes Drill Co., 854 Chestnut St., Rockford, Ill. *Phone*: 4-8661 (Tool Show Booth 1127)

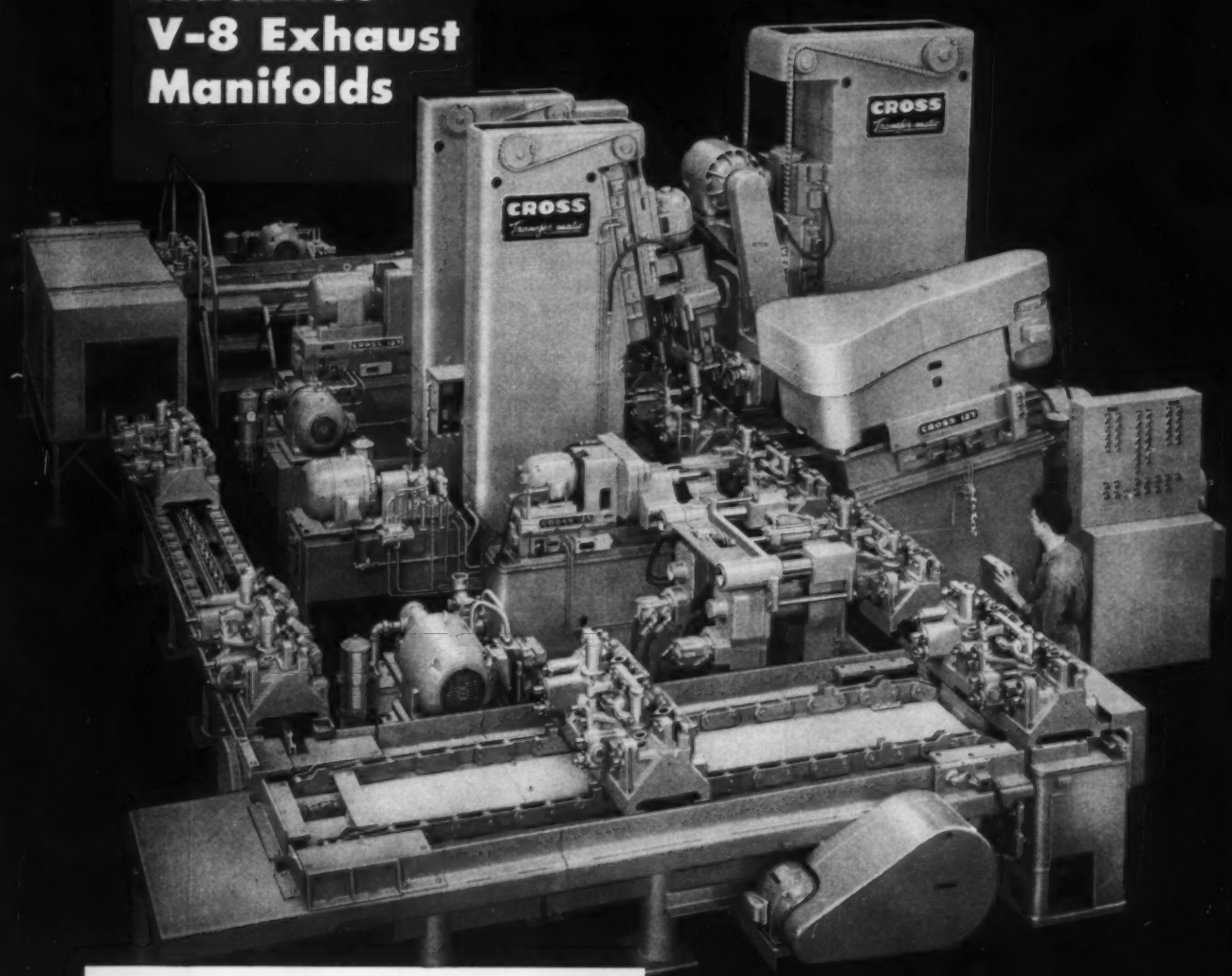
Thread Rolling

Both straight and taper threads can be made with the new Lanroll attachment by the use of proper



Completely Machines V-8 Exhaust Manifolds

Another Transfer-matic by Cross



- ★ 51 operations: 8 milling; 37 drilling, chamfering and spotfacing; and 6 tapping.
- ★ Palletized work holding fixtures for holding one right hand and one left hand part.
- ★ Automatic power wrench for operating work holding fixtures.
- ★ Automatic transfer mechanism.
- ★ All parts in Cross machines—even tooling details—are made to interchangeable tolerances for fast, easy maintenance.
- ★ Other features: Construction to JIC standards; hardened and ground ways; hydraulic feed and rapid traverse for milling, drilling and boring; individual lead screw feed for tapping.

Established 1898

THE CROSS CO.

First in Automation

DETROIT 7, MICHIGAN

NEW PRODUCTS and equipment

thread rolls and auxiliary equipment.

To produce the taper, rolls are supported on carbide shafts inclined to the taper of the thread. The roll threads are parallel to the roll axis and have constant helix. *Write*: Landis Machine Co., 217 S. 11th St., Waynesboro, Pa. *Phone*: Walnut 3-1620 (Tool Show Booth 578)

Nut Running

Using the torsion bar principle, this tool runs nuts to a preset torque and shuts off automatically.

There are two sizes, a small one for torques up to 90 ft lb and a heavy one for torques up to 550 ft lb. *Write*: Ingersoll-Rand Co., 11 Broadway, New York 4, N. Y. *Phone*: Digby 4-6070 (Tool Show Booth 345)

Tool Steels

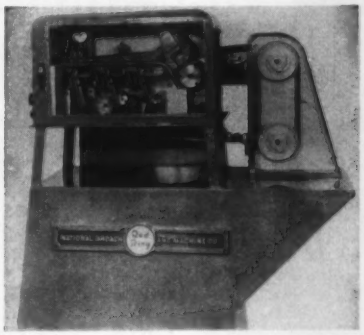
Steel that is cleaner, more homogeneous, has fewer inclusions and is more gas free is made by consumable electrode vacuum remelting.

It can be used for high temperature bearings in jet aircraft, for rolls requiring a high finish and polish, etc. *Write*: Allegheny Ludlum Steel Corp., Room 2036 Henry W. Oliver Bldg., Pittsburgh 22, Pa. *Phone*: Grant 1-1085 (Tool Show Booth 619)

Gear Gaging

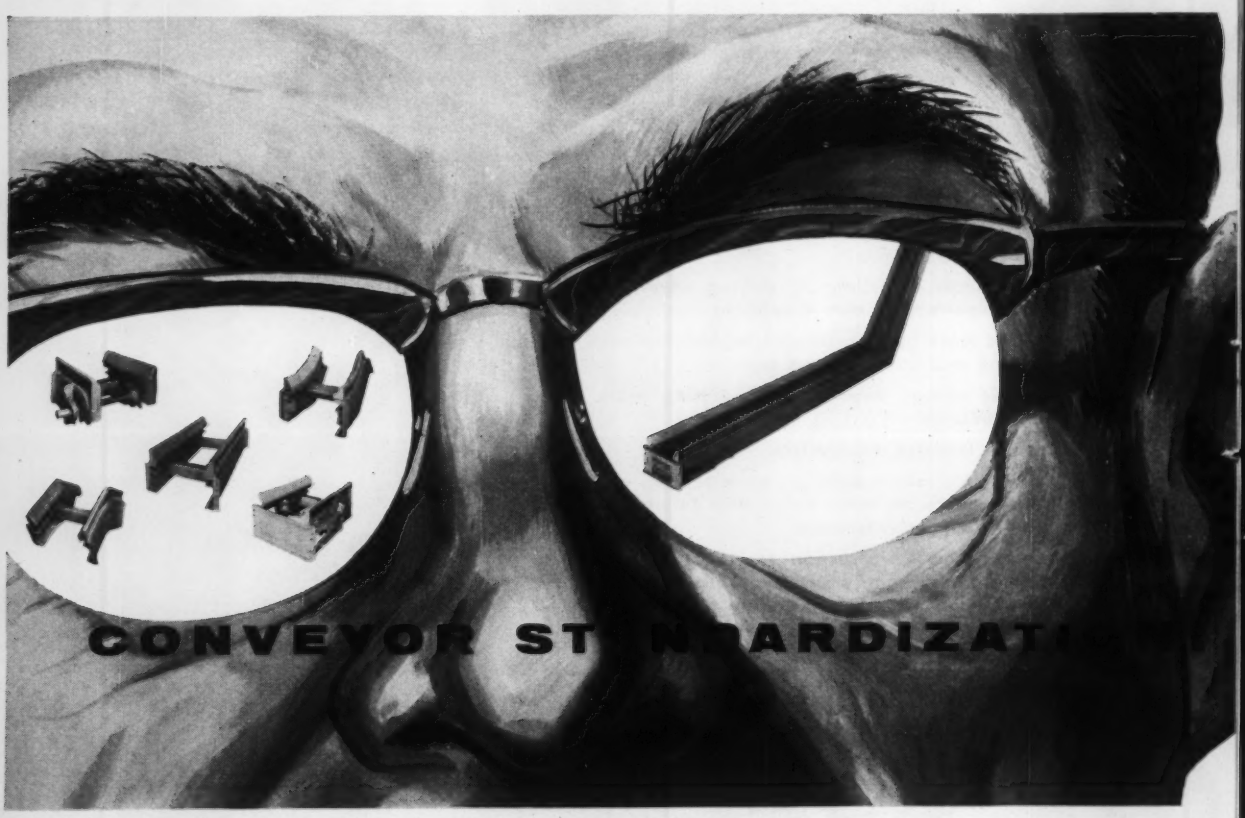
Here is an automatic gaging and sorting machine that checks pinions to tenths of a thousandth and sorts them into undersize, oversize and O.K. classes.

If more than a set number of the same type of rejections are made in succession, a device shuts down the gear cutting machine. *Write*: National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich. *Phone*: Walnut 1-8980 (Tool Show Booth 816)



Bar Bender

This new machine rapidly bends concrete reinforcing bars, stirrup bars and tie bars. It forms smooth



NEW PRODUCTS and equipment

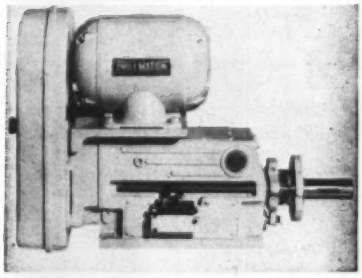
rounds, squares and deformed bar stock of all types.

Its capacity is two 1¼-in.-diameter steel bars or eight ½-in. bars. *Write*: Pines Engineering Co., Aurora, Ill. *Phone*: Aurora 6-7701 (Tool Show Booth 197)

Automatic Tapping

This machine tool component can tap up to ⅞-in. of steel continuously. Its quill travel is 5 in.

The tap approaches the work rapidly, then taps through a lead screw with locked-circuit feed and thrust control, then returns rapidly. *Write*: Drillmation Co., 21511 John R St., Hazel Park, Mich. *Phone*: Jordan 4-6424 (Tool Show Booth 737)



Industrial Wiper

A disposable paper wiper combines thorough cleaning action and maximum dirt retention. Chemical treatment creates important wet strength.

The wipers are sanitary and help reduce the accident rate; they don't contain steel shavings, filings or chips from a previous job. *Write*: Scott Paper Co., Chester, Pa. *Phone*: Chester 4-4211 (Tool Show Booth 228)

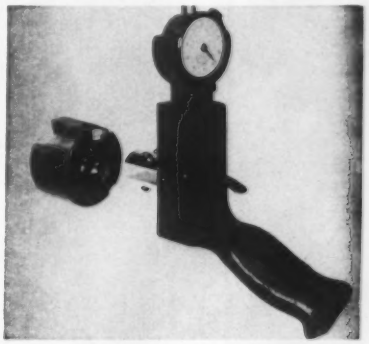
Torque Motor

This oscillating motor has a maximum rotation of 280 degrees. It operates at efficiencies up to 98 per cent and withstands heat up to 650° F. Speeds are limited only by fluid pressure volume.

The squareness of the unit makes mounting on any of six faces easy. Standard and special sizes move loads ranging from ounces to tons. *Write*: Roto-Mation Inc., Greenville, O. (Tool Show Booth 724)

Dial Spiral Gage

Interchangeable jaws are used to check groove diameters, thread pitch diameters, ball race diameters, etc. Gaging is accurate to



0.0001-in. over a 6-in. range. *Write*: Nilsson Gage Co. Inc., Box 505, 255 Mansion St., Poughkeepsie, N. Y. *Phone*: 7980 (Tool Show Booth 717)

Now you can buy CUSTOMIZED conveyors in pre-fabricated STANDARD sections

In a single glance, you can see all of the advantages of MAY-FRAN STANDARDIZED components.

The five standard sections shown can be assembled to form virtually any type of *"customized"* conveyor for the handling of stampings, formed metal parts, forgings, automotive scrap, chips and turnings.

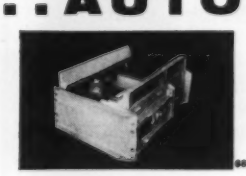
Straight sections . . . concave or convex sections . . . take-up charge and discharge-end sections can be furnished to meet specific requirements of belt width as well as load bearing and volume capacities.

A single glance at the MAY-FRAN conveyor standardization program, and you will see savings never before possible. In addition you will see unsurpassed conveyor flexibility.

MAY-FRAN . . . a name long recognized in the materials handling field . . . is **FIRST** again with *standardized* components for your *customized* installation.

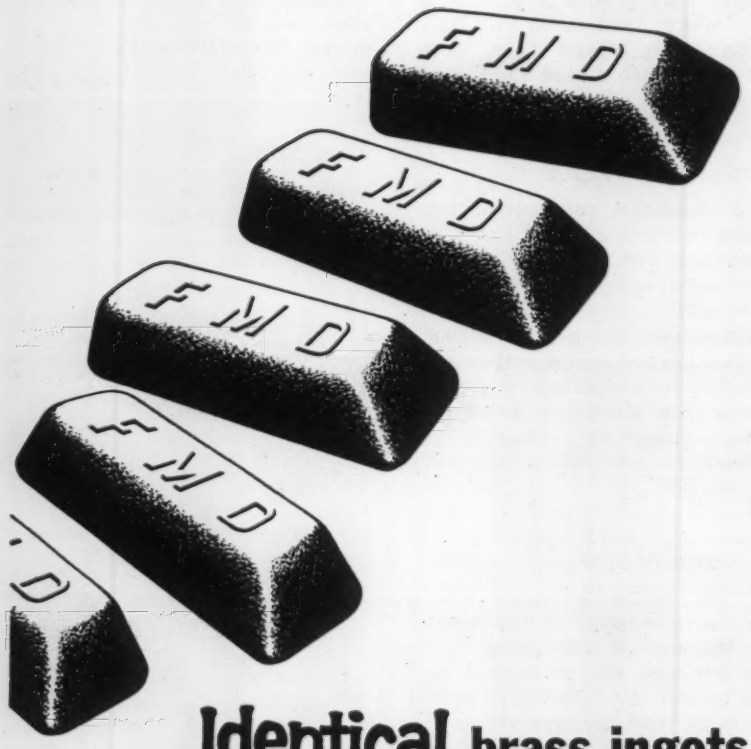
Write today for complete information.

. . . AUTOMATION . . . . . AND YOU!



MAY-FRAN ENGINEERING, INC.

1725 Clarkstone Road • Cleveland 12, Ohio



Identical brass ingots now . . . or a year from now

Your order for specification brass today and your order for the same brass a year from now will be identical. Every heat of brass that Federated pours is carefully and repeatedly analyzed. Quality control at Federated is not just an occasional check, but is a regular step in every phase of our production program.

If your castings are hard to pour, or if they are designed for difficult, specialized service, this quality control is important to your customers. They must know that every order you fill will be identical so that they can buy from you with complete confidence.

Federated has a foundry service organization that can help you with any casting problems. Experts who know the cause of casting failures are available to visit your foundry and make corrective suggestions. And backing up these experienced servicemen is a complete, modern, non-ferrous metals laboratory that can trace the cause of trouble right back to its source.

Take advantage of these Federated extras. So many foundries do that we are known as Headquarters for Non-Ferrous Foundry Metals and for technical information on foundry problems. We have 13 plants and 23 sales offices across the country. Any of them will be pleased to help you.

Federated Metals

DIVISION OF AMERICAN SMELTING AND REFINING COMPANY
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Aluminum, Anodes, Babbitts, Brass, Bronze, Die Casting Metals, Lead and Lead Products, Magnesium, Solders, Type Metals, Zinc Dust

NEW Literature

Miniaturization

This 20-page bulletin analyzes graphically the steps leading to miniaturization. Standard Pressed Steel Co., Box 579, Jenkintown, Pa.

Power Transmission

This bulletin describes an infinitely variable speed reducer and constant torque converter—12 pages. Revco Inc., 2 E. Franklin Ave., Minneapolis 4, Minn.

Copy Grinding

Here's a method for grinding two duplicate parts at the same time—4 pages. Carl Hirschmann Co. Inc., 30 Park Ave., Manhasset, N. Y.

Overhead Handling

A case study tells how overhead handling systems boost production and cut costs in plant and warehouse operations—bulletin M-31, 6 pages. Whiting Corp., 157 Lathrop Ave., Harvey, Ill.

V-Belt Drives

Here's how to engineer a V-belt drive—bulletin 20E8297, 36 pages. Allis-Chalmers Mfg. Co., 1021 S. 70th St., Milwaukee, Wis.

Plastic Pipe

Bulletin 80-3 (8 pages) lists over 200 chemicals that polyvinyl chloride pipe will convey. Joseph T. Ryerson & Son Inc., P.O. Box 8000-A, Chicago 80, Ill.

Magnetic Separator

A technical sheet describes a separator that uses a flat magnetic field instead of a drum. Dept. MS-297, Industrial Filtration Co., Lebanon, Ind.

Flat-Plate Batteries

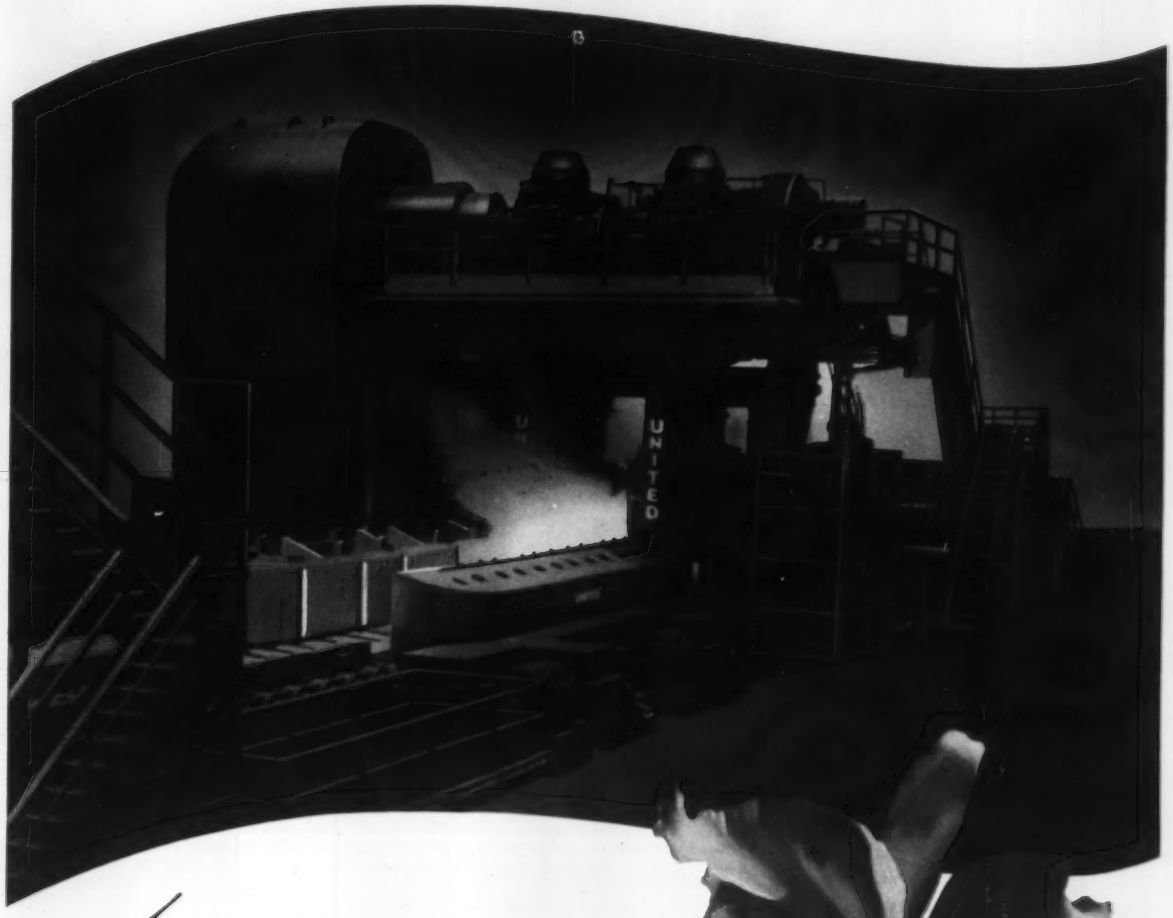
A cutaway drawing shows the construction of batteries with high power and efficiency. Dept. PC-2, Exide Industrial Division, Electric Storage Battery Co., Box 8109, Philadelphia 1, Pa.

Hacksaws and Band Saws

Revised booklets tell how to use hand hacksaws, power hacksaws and band saws. Capewell Mfg. Co., 60 Governor St., Hartford, Conn.

Plastics

A booklet charts the effects of 400 reagents on polyethylene and polyvinyl chloride. American Agile Corp., P. O. Box 168, Bedford, O.



An Orchid to a Champion

45" Reversing Slabbing Mill which has broken all world records by rolling 214,842 net slab tons in one month.

designed and built by

United

ENGINEERING AND FOUNDRY COMPANY

Pittsburgh, Pennsylvania

PLANTS AT PITTSBURGH • VANDERGRIFT • YOUNGSTOWN
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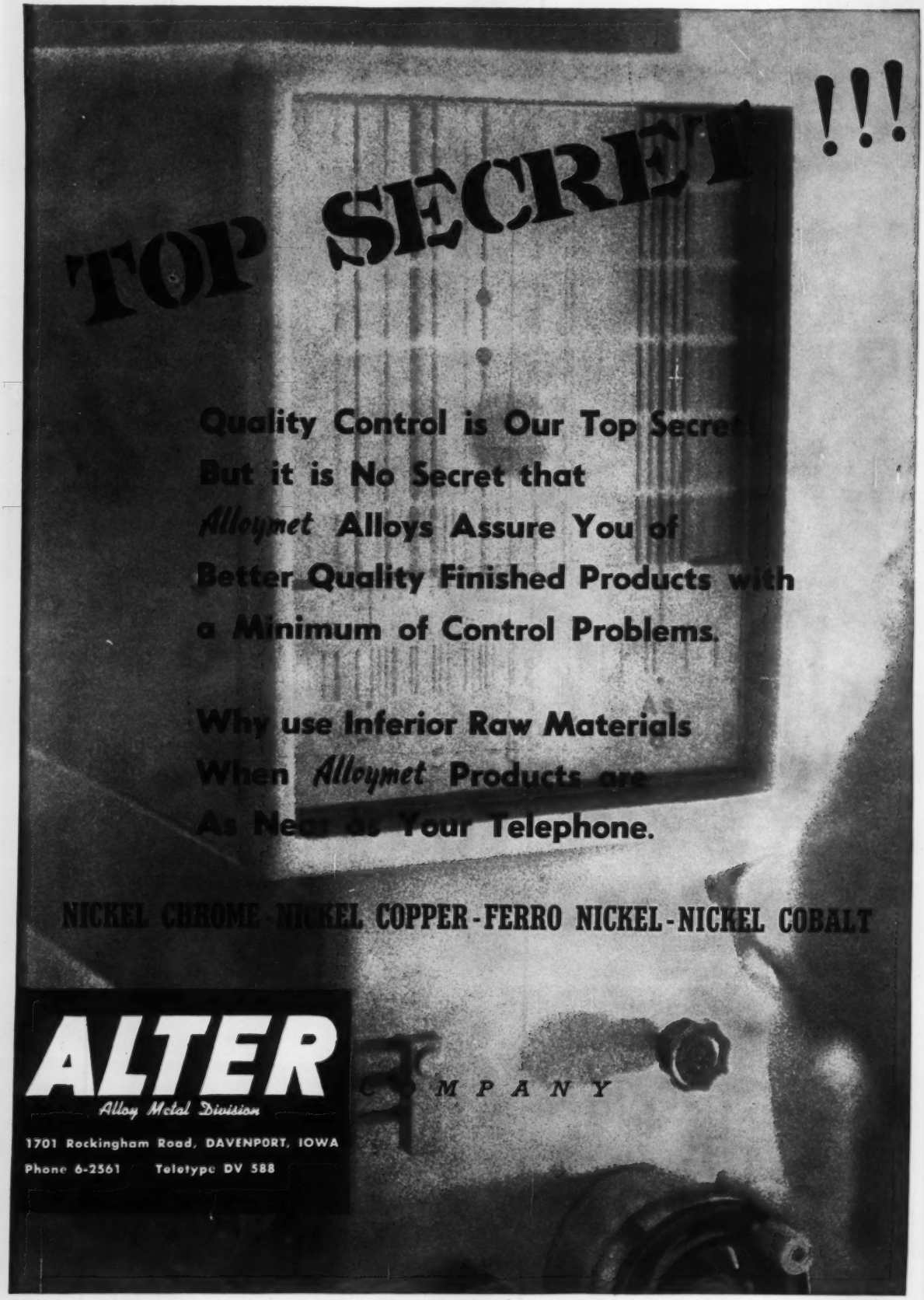
SUBSIDIARIES: ADAMSON UNITED COMPANY, AKRON, OHIO
STEDMAN FOUNDRY AND MACHINE CO., INC., AURORA, INDIANA

Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.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Quality Control is Our Top Secret
But it is No Secret that
Alloymet Alloys Assure You of
Better Quality Finished Products with
a Minimum of Control Problems.
Why use Inferior Raw Materials
When Alloymet Products are
As Near as Your Telephone.
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Phone 6-2561 Teletype DV 588

STEEL

March 12, 1956

Market Outlook

STEEL PRICES will go up by more than the added cost of labor. Reason: Other steelmaking costs are going up, too. Latest examples: Railroad freight rates and plant construction costs.

The general 6-per-cent rail freight rate increase which became effective Mar. 7 will raise the cost of raw materials delivered to the steel mills. It takes 2.5 tons of raw materials to make 1 ton of ingot steel.

BUILDING UP—Construction, another big item in steel company costs, continues upward. Every index of construction costs shows that. The steel industry, with nearly 15 million tons of added ingot capacity under way or projected for the next three years, will have to continue expanding at a 4-million-ton-a-year average until 1970 to provide for the nation's growing economy. In addition, a substantial portion of present capacity will have to be replaced. Steelmaking equipment lasts around 25 years.

MORE FOR ORE—The iron and steel industry will be paying more for iron ore, too, when the 1956 lake shipments of it start in the next month. The 1956 price is about 8 per cent above last year's.

STEEL predicted last November that steel prices may go up $12 a ton by next July. That would be an increase of about 10 per cent. Since last November, steel prices have edged up 1.6 per cent, mostly in the form of extras. Products that cost more are: Plates, hot-rolled bars, cold-finished bars, hot-rolled sheets, galvanized sheets, hot-rolled strip, cold-rolled strip, buttweld pipe, line pipe, railway axles and wire.

PREDICTION—Tin mill prices are expected to go up Apr. 1. Tin mill products are priced for six-month periods, and the new period begins Apr. 1. New schedules must take into consideration the increase in costs since last Oct. 1 and the increase (including higher costs of labor) that will occur before next Oct. 1.

Nail prices were nudged up 60 cents a ton by one producer last week. The previous price was $152 a ton.

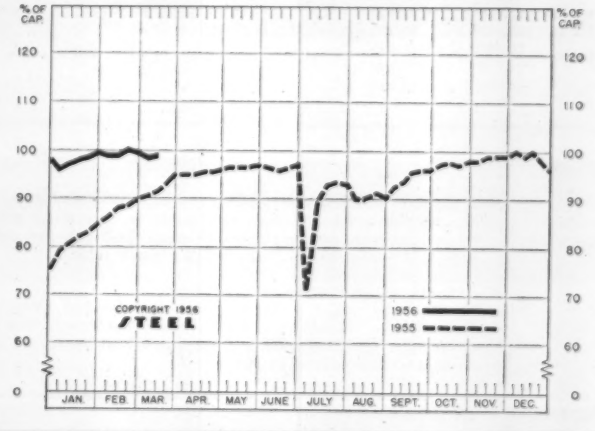
SCRAP TRENDS—Steelmaking scrap—one raw material of the steel industry—has gone down in price, but it still is higher than it was a year ago. STEEL's price composite on steelmaking scrap was $48.50 a gross ton in the week ended Mar. 7, compared with a high of $53.33 in mid-January and $37.33 a year ago.

STEEL's price composite on finished steel holds at $128.02 a net ton.

OUTPUT UP—Heavy bookings of steel orders sustains a high production rate. In the week ended Mar. 11, production of steel for ingots and castings rose a half a point over that of the preceding week and registered 99 per cent of capacity. Production in the first ten weeks of this year averaged 2,438,800 net tons a week, a 16 per cent gain over the weekly 2,099,100 tons of the corresponding period of last year.

CARRYOVER—While some consumers, notably the automobile industry, have asked that steel shipments to them be delayed, other users are taking any extra tonnage available. Mills will have less undelivered tonnage on their order books at the start of the second quarter than at the beginning of the first, but they will still have a carry-over.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

(Percentage of Capacity Engaged)

	Week Ended Mar. 11	Change	Same Week 1955	Same Week 1954
Pittsburgh	101.5	— 0.5*	93.5	79
Chicago	99	— 0.5*	97.5	75
Mid-Atlantic	100	0	89	65
Youngstown	97	0	95	66
Wheeling	96.5	— 0.5	92.5	82.5
Cleveland	102.5	+ 2*	97	65
Buffalo	105	0	92.5	63.5
Birmingham	96	+ 1	86.5	78.5
New England	75	0	80	60
Cincinnati	97.5	0	85	71.5
St. Louis	106	0	96	43.5
Detroit	100.5	+ 3.5*	89	76
Western	104	— 4	96	74
National Rate	99	+ 0.5	91.5	68.5

INGOT PRODUCTION‡

	Week Ended Mar. 11	Week Ago	Month Ago	Year Ago
INDEX (1947-1949=100)	158.8†	153.1	151.8	139.5
NET TONS (In thousands)	2,422†	2,459	2,439	2,241

*Change from preceding week's revised rate. †Estimated. ‡Amer. Iron & Steel Institute. Weekly capacity (net tons): 2,461,893 in 1956; 2,413,278 in 1955; 2,384,549 in 1954.

Metalworking Outlook—p. 77

Price Indexes and Composites

FINISHED STEEL, Price Index (Bureau of Labor Statistics)

	Mar. 6 1956	Feb. 28 1956	Month Ago	Feb. Average
(1947-1949=100)	157.1	157.1	157.1	157.1

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Mar. 6

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them write to STEEL.

Rails, Standard, No. 1	$4.800	Sheets, Electrical	$10.175
Rails, Light, 40 lb	6.217	Strip, C.R., Carbon	8.243
Tie Plates	5.625	Strip, C.R., Stainless, 403 (lb)	0.444
Axles, Railway	8.350	Strip, H.R., Carbon	5.606
Wheels, Freight Car, 33 in. (per wheel)	52.50	Pipe, Black, Buttweld (100 ft)	16.997
Plates, Carbon	5.200	Pipe, Galv., Buttweld (100 ft)	21.137
Structural Shapes	4.867	Pipe, Line (100 ft)	167.250
Bars, Tool Steel, Carbon (lb)	0.460	Casing, Oil Well, Carbon (100 ft)	165.120
Bars, Tool Steel Alloy, Oil Hardening Die (lb)	0.560	Casing, Oil Well, Alloy (100 ft)	244.670
Bars, Tool Steel, H. R., Alloy, High Speed W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.60 (lb)	1.185	Tubes, Boiler (100 ft)	39.470
Bars, Tool Steel, H.R., Alloy, High Speed W-18, Cr 4, V 1 (lb)	1.680	Tubing, Mechanical, Carbon	20.980
Bars, H.R., Alloy	9.425	Tubing, Mechanical Stainless, 304 (100 ft)	178.897
Bars, H.R., Stainless, 303 (lb)	0.450	Tin Plate, Hot-dipped, 1.25 lb	8.933
Bars, H.R., Carbon	5.500	Tin Plate, Electrolytic, 0.25 lb	7.633
Bars, Reinforcing	5.313	Black Plate, Canmaking Quality	6.733
Bars, C.F., Carbon	8.800	Wire, Drawn, Carbon	8.575
Bars, C.F., Alloy	12.275	Wire, Drawn, Stainless 430 (lb)	0.590
Bars, C.F., Stainless, 302 (lb)	0.475	Bale ties (bundle)	6.473
Sheets, H.R., Carbon	5.345	Nails, Wire, 8d Common	8.595
Sheets, C.R., Carbon	6.214	Wire, Barbed (80-rod spool)	7.847
Sheets, Galvanized	7.770	Woven Wire Fence (20-rod roll)	18.635
Sheets, C.R., Stainless 302 (lb)	0.588		

STEEL's FINISHED STEEL PRICE INDEX*

	Mar. 7 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Index (1935-39 av.=100)	209.10	209.10	209.10	194.53	171.92
Index in cents per lb	5.665	5.665	5.665	5.270	4.657

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT*	$128.02	$128.02	$128.02	$117.82	$106.32
No. 2 Fdry, Pig Iron, GT	58.99	58.99	58.99	56.54	52.54
Basic Pig Iron, GT	58.49	58.49	58.49	56.04	52.16
Malleable Pig Iron, GT	59.77	59.77	59.77	57.27	53.27
Steelmaking Scrap, GT	48.50	48.17	48.96	37.33	44.00

*For explanation of weighted index see STEEL, Sept. 19, 1949, p. 54; of arithmetical price composite, STEEL, Sept. 1, 1952, p. 130.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Mar. 7 1956	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh	4.65	4.65	4.65	4.30	3.70
Bars, H.R., Chicago	4.65	4.65	4.65	4.30	3.70
Bars, H.R., deld. Philadelphia	4.90	4.90	4.90	4.55	4.18
Bars, C.F., Pittsburgh	6.25*	6.25*	6.25*	5.40	4.55
Shapes, Std., Pittsburgh	4.60	4.60	4.60	4.25	3.65
Shapes, Std., Chicago	4.60	4.60	4.60	4.25	3.65
Shapes, deld., Philadelphia	4.88	4.88	4.88	4.53	3.90
Plates, Pittsburgh	4.50	4.50	4.50	4.225	3.70
Plates, Chicago	4.50	4.50	4.50	4.225	3.70
Plates, Coatesville, Pa.	4.80	4.80	4.80	4.225	4.15
Plates, Sparrows Point, Md.	4.50	4.50	4.50	4.225	3.70
Plates, Claymont, Del.	4.80	4.80	4.80	4.225	4.15
Sheets, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.60-3.75
Sheets, H.R., Chicago	4.325	4.325	4.325	4.05	3.60
Sheets, C.R., Pittsburgh	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Chicago	5.325	5.325	5.325	4.95	4.35
Sheets, C.R., Detroit	5.325-5.425	5.325-5.425	5.325-5.425	5.10	4.55
Sheets, Galv., Pittsburgh	5.85	5.85	5.85	5.45	4.80
Strip, H.R., Pittsburgh	4.325	4.325	4.325	4.05	3.75-4.00
Strip, H.R., Chicago	4.325	4.325	4.325	4.05	3.50
Strip, C.R., Pittsburgh	6.25	6.25	6.25	5.75	4.65-5.35
Strip, C.R., Chicago	6.25-6.35	6.25-6.35	6.25-6.35	5.85	4.90
Strip, C.R., Detroit	6.35	6.35	6.35	5.90	4.35-5.60
Wire, Basic, Pittsburgh	6.60	6.60	6.60	5.75	4.85-5.10
Nails, Wire, Pittsburgh	7.60	7.60	7.60	6.85	5.90-6.20
Tin plate (1.50 lb), box, Pitts.	$9.45	$9.45	$9.45	$9.05	$8.70

*Including 0.35c for special quality.

SEMIFINISHED STEEL					
Billets, Forging, Pitts. (NT)	$84.50	$84.50	$84.50	$78.00	$66.00
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	5.375	5.375	5.375	4.675	4.10-4.30

PIG IRON, Gross Ton					
Bessemer, Pitts.	$59.50	$59.50	$59.50	$57.00	$53.00
Basic, Valley	58.50	58.50	58.50	56.00	52.00
Basic, deld. Phila.	62.16	62.16	62.16	59.66	56.39
No. 2 Fdry, Pitts.	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Chicago	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, Valley	59.00	59.00	59.00	56.50	52.50
No. 2 Fdry, deld. Phila.	62.66	62.66	62.66	55.16	56.89
No. 2 Fdry, Birm.	55.00	55.00	55.00	52.88	48.88
No. 2 Fdry (Birm.) deld. Cin.	62.70	62.70	62.70	60.58	55.58
Malleable, Valley	59.00	59.00	59.00	56.50	52.50
Malleable, Chicago	59.00	59.00	59.00	56.50	52.50
Ferromanganese, Duquesne	205.00†	205.00†	205.00†	190.00†	188.00*

†74-76% Mn, net ton. *75-82% Mn, gross ton, Etna, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pitts.	$48.50	$47.50	$50.50	$38.50	$45.00
No. 1 Heavy Melt, E. Pa.	50.00	50.00	51.50	39.50	43.50
No. 1 Heavy Melt, Chicago	47.00	47.00	49.00	34.00	43.50
No. 1 Heavy Melt, Valley	52.50	52.50	53.00	37.50	45.00
No. 1 Heavy Melt, Cleve.	49.50	49.50	49.50	35.50	44.00
No. 1 Heavy Melt, Buffalo	46.50	46.50	46.50	32.50	44.00
Rails, Rerolling, Chicago	65.50	65.50	66.50	49.50	52.50
No. 1 Cast, Chicago	46.50	46.50	46.50	40.00	49.00

COKE, Net Ton					
Beehive, Furn, Connlsvl.	$14.125	$14.125	$14.125	$13.75	$14.75
Beehive, Fdry, Connlsvl.	16.50	16.50	16.50	16.75	17.50
Oven, Fdry, Chicago	27.00	27.00	27.00	24.50	21.00

Daily Nonferrous Price Record

	Price Mar. 7	Last Change	Previous Price	Feb. Avg.	Jan. Avg.	Mar. 1955 Avg.
Copper	46.00-53.00	Feb. 23, 1956	46.00-52.00	48.076	46.700	33.222
Lead	15.80	Jan. 13, 1956	16.30	15.800	15.960	14.800
Zinc	13.50	Jan. 6, 1956	13.00	13.500	13.440	11.500
Tin	101.50	Mar. 6, 1956	101.25	100.908	105.067	91.176
Nickel	64.50	Nov. 24, 1954	60.00	64.500	64.500	64.500
Aluminum	24.40	Aug. 8, 1955	23.20-24.40	24.400	24.400	23.200
Magnesium	32.50	Aug. 16, 1955	28.50	32.500	32.500	27.556

Quotations in cents per pound based on: COPPER, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, E. St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingots, 99 + %, deld.; MAGNESIUM, 99.8%, Freeport, Tex.

What You Can Use the Markets Section for:

- **A source of price information.**
  Current prices are reported each week. Price changes are shown in italics. Price trends are shown in tables of indexes and comparisons.
- **A directory of producing points.**
  Want to know who makes something, or where it is made? The steel price tables alphabetically list the cities of production and indicate the producing company. If you are a buyer, you may want to make a map showing comparative distances of sources of supply and to help you compute freight costs. If you are a seller of supplies you can make a map to spot your sales possibilities.
- **A source of price data for making your own comparisons.**
  Maybe you want to keep a continuous record of price spread between various forms of steel. You can get your base price information from STEEL's price tables.
- **A source of information on market trends.**
  Newsy items tell you about the supply-demand situation of materials, including iron and steel, nonferrous metals and scrap. Other articles analyze special situations of interest and importance to you.
- **Reports on iron and steel production, and materials and product shipments.**

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Nonferrous Metals

Lead and zinc producers have varying sales patterns, but demand for both metals remains at satisfactory levels. U. S. continues to provide firm market floor

Nonferrous Metal Prices, Pages 224 & 225

LEAD AND ZINC demand is somewhat varied. Some primary and secondary producers report that demand is satisfactory. Others indicate that sales volumes are good, but that they are eating up backlogged orders.

One large producer told STEEL: "We have had several heavy days for both lead and zinc during the last ten days." Most will admit that March bookings are good—somewhat better than they had hoped for.

Zinc—Special high grade is off due to automotive cutbacks, but producers are saying that this will be remedied within the next two months as tooling for '57 models starts.

It is anyone's guess as to how many pounds of zinc diecastings will go into 1957 cars. One zinc industry spokesman points out that the trend toward the four-door hardtop may hold the key. Most window frames are made of zinc diecastings, and with the trend toward the four-door model, this could help boost the amount of diecasting used.

Guesstimate—If the auto industry follows its present pattern, it will probably order less trim on the completely restyled 1957 models, so that '58 and '59 cars can be facelifted by adding trim. This could reduce the over-all requirements for zinc diecastings. While there are no absolute statistics (estimates on the amount of zinc in the average car range from 50 to 70 lb), most producers feel that zinc will hold its own or be used in slightly greater quantities by motordom during the coming model year. One optimistic zinc advocate reports: "It's still early (feelers are just beginning to come in from Detroit), but zinc diecastings could show gains of 12 to 15 per cent in the new models."

Conclusion—While the percentages gained may vary, lead and zinc will continue to post strong sales during the coming months. The market is firm; the government is providing a strong floor.

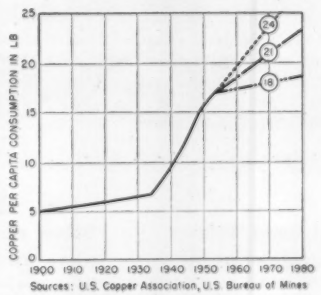
Tin Prices Whirl

A tin buffer organization to help stabilize its price probably will be in operation in the next six months, but some tin men are not smiling. They are quick to point out that buffer organizations have been set up before, and they report: "Prices were not controlled, and only the inside London people were helped."

Tin users point out that the highly fluctuating London market (a rumor can send the price zooming) is making it impossible to do anything but try to stay even on tin requirements. It is impossible, they say, to carry an inventory as long as prices may vary as much as 10 cents a pound in a single month.

Meanwhile, tin men are watching the Texas City smelter situation. There is a growing uneasiness among those interested in the future of tin as they begin to wonder what influence a political year will have on the drive to close the government owned tin smelter. The troubled Middle East sent prices on the London market to about $1.03 per pound last week. Earlier, the news of what appears to be a peaceful settlement of the threatened Malayan tinworkers' strike plummeted prices to about $1 a pound on the London Metal Exchange.

Portrait of a Market



Sources: U.S. Copper Association, U.S. Bureau of Mines

BY 1970, per capita consumption of copper is expected to hit 24 lb. That's 41 per cent above the 17-lb figure today. The estimate assumes several things, says the Copper & Brass Research Association, including: A reasonable price for copper; continued research; fulfillment of expansion plans of present consumers, especially the electric utilities; and sufficient supply. The other two trend lines above would result under conditions less favorable to the red metal. But in either instance, the direction is still up. When you combine the expected increase in population with the uptrend in consumption, the net result is a broader market for copper.

No Nickel Price Hike

Please - do - not - quote industry sources explain that while it could happen next week, next month or next year, there is nothing on the "front burner" which would indicate that there will be a nickel price hike.

Point to remember: The International Nickel Co. would have to be the leader in such a move. It is already receiving record-breaking revenue from its copper mining interests. With profits from copper interests at peak levels, INCO probably has little desire to raise prices at this time. Indications are that the small producers are screaming for the increase.

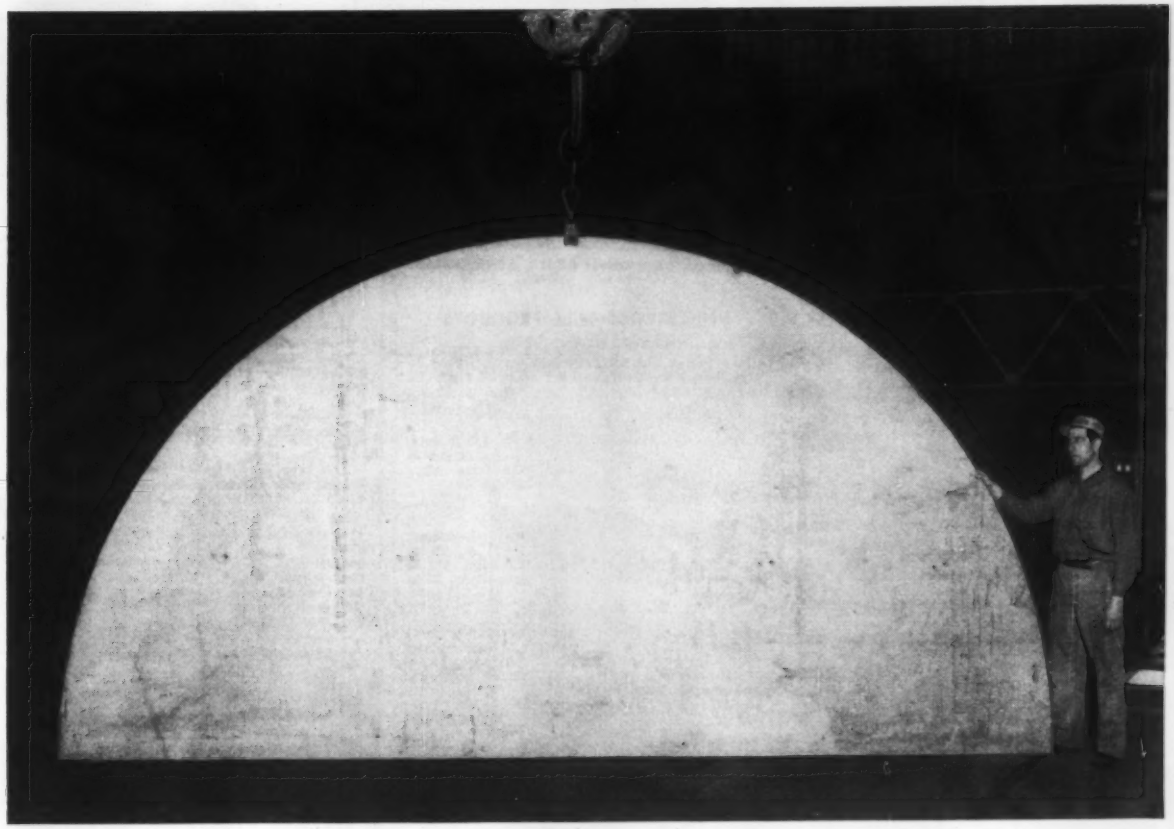
Copper Men Perplexed

Copper jumped to about 54 cents a pound on the London market last week. While primary producers indicate that Chile has not put pressure on them to raise prices, there is a general feeling that it will be only a matter of time if the London market holds at current levels. Copper, report perplexed industry men, is beginning to act like tin. One rumor, large transaction or mild labor disturbance sends the price skyrocketing. Domestic producers report that they still must base the U. S. price on "where there is a strong market." Most feel that there would be only a short-term market at 50 to 53 cents a pound.

Rumor of the week: Prices are skyrocketing in copper, but there are those who say that the factors which usually foretell a price decline are still at work.

Magnesium Production Up

Magnesium primary ingot production reached 6337 tons in January, says the Magnesium Association. This is a 1.7-per-cent jump over December; a 25-per-cent gain over January, 1955. Wrought product shipments (1059 tons) were up 34 per cent from December, 19 per cent over January, 1955, total.



Carlson specialized service keeps your costs low

Here's how Carlson *specialized service* in stainless plate worked on this job.

The illustration shows one of two segments of a tank head blank. Made of 1″ thick, Type 302 stainless steel, the head blank measures 210″ in diameter and weighs approximately 9000 pounds. Each segment was produced so accurately the customer did not have to "true up" the abrasive cut straight edges before welding the two segments together. This meant the customer had what he wanted, the way he wanted it—produced to his exact requirements.

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Nonferrous Metals

Cents per pound, carlots, except as otherwise noted

PRIMARY METALS AND ALLOYS

Aluminum: 99 + %, ingots, 24.40; pigs 22.50, 10,000 lb or more, f.o.b. shipping point. Freight allowed on 500 lb or more.

Aluminum Alloy: No. 13, 12% Si, 26.20; No. 43, 5% Si, 26.00; No. 142, 4% Cu, 1.5% Mg, 2% Ni, 28.20; No. 195, 4.5% Cu, 0.8% Si, 27.60; No. 214, 3.8% Mg, 27.80; No. 356, 7% Si, 0.3% Mg, 26.20.

Antimony: R.M.M. brand, 99.5%, 33.00; Lone Star brand, 33.50, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 27.00-28.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97%, lump or beads, $71.50 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $72.75 per lb of contained Be, f.o.b. Reading, Pa., Elmore, O.

Beryllium Copper: 3.75-4.25% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. Reading, Pa., or Elmore, O.

Bismuth: $2.25 per lb ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 97-99%, $2.60 per lb for 550-lb keg; $2.62 per lb for 100-lb case; $2.67 per lb under 100 lb.

Columbium: Powder, $119.20 per lb, nom.

Copper: Electrolytic, 46.00 deld. Conn. Valley; 46.00 deld. Midwest: custom smelters, 53.00 deld.; Lake, 46.00 deld.; Fire refined, 45.75 deld.

Germanium: First reduction, $201.85-$220 per lb; intrinsic grade, $220-$242.67 per lb, depending on quantity.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $100-$110 nom. per troy oz.

Lead: Common, 15.80; chemical, 15.90; corroding, 15.90, St. Louis. New York basis, add 0.20.

Lithium: 99+, cups or ingots, $11.50; rod $13.50; shot or wire, $14.50, f.o.b. Minneapolis, 100 lb lots.

Magnesium: Pig, 32.50 f.o.b. Velasco, Tex.; ingot, 33.25 f.o.b. Velasco, Tex.

Magnesium Alloys: AZ91B (diecasting), 31.00 deld.; AZ63A, AZ92A, AZ91C (sand casting), 36.00 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $264-$267 per 76-lb flask.

Molybdenum: Powder, 99% hydrogen reduced, $3.20 per lb; pressed ingot, $4.06 per lb; sintered ingot, $5.53 per lb.

Nickel: Electrolytic cathodes, sheets (4 x 4 in. and larger), unpacked, 64.50; 10-lb pigs, unpacked, 67.65; "XX" nickel shot, 69.00; "F" nickel shot or ingots for addition to cast iron, 64.50; prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 0.92.

Osmium: $80-$100, nom. per troy oz.

Palladium: $23-$24 per troy oz.

Platinum: $97-$112 per troy oz from refineries.

Radium: $16-$21.50 per mg radium content, depending on quantity.

Rhodium: $118-$125 per troy oz.

Ruthenium: $45-$55 per troy oz.

Selenium: 99.5%, $13.50-$15.50 per lb.

Silver: Open market, 91.125 per troy oz.

Sodium: 16.50, c.l.; 17.00 l.c.l.

Tantalum: Sheet, rod, $68.70 per lb; powder, $56.63 per lb.

Tellurium: $1.50-$1.75 per lb.

Thallium: $12.50 per lb.

Tin: Straits, N. Y., spot and prompt, 101.50.

Titanium: Sponge, 99.3+%, grade A-1 ductile (0.3% Fe max), $3.45; grade A-2 (0.5% Fe max), $3.15 per pound.

Tungsten: Powder, 98.8%, carbon reduced, 1000-lb lots, $4.50 per lb, nom., f.o.b. shipping point; less than 1000 lb add 15.00; 99 + % hydrogen reduced, $5.00. Treated ingot, $6.70.

Zinc: Prime Western, 13.50; brass special, 13.75; intermediate, 14.00, East St. Louis, freight allowed over 0.50 per pound. High grade, 14.85; special high grade, 15.25 deld. Diecasting alloy ingot No. 3, 18.00; No. 2, 19.00; No. 5, 18.50, deld.

Zirconium: Ingots, commercial grade, $14.40 per lb; low-hafnium reactor grade, $23.07. Sponge, commercial grade, $7.50-$10.00 per lb, depending on quantity; reactor grade, $14.00-$22.00 per lb, depending on quantity. Powder, electronics grade, $15 per lb; flash grade, $11.50.

(Note: Chromium, manganese and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 30.25-32.75; No. 12 foundry alloy (No. 2 grade), 29.00; 5% silicon alloy, 0.60 Cu max, 30.50-31.25; 13 alloy, 0.60 Cu max, 30.50-31.25; 195 alloy, 30.50-31.25; 108 alloy, 29.00-29.50. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 29.75-30.25; grade 2, 28.75; grade 3, 28.00; grade 4, 27.50-28.50.

Brass Ingot: Red brass, No. 115, 44.00; tin bronze, No. 225, 58.00; No. 245, 50.75; high-leaded tin bronze, No. 305, 47.75; No. 1 yellow, No. 405, 34.75; manganese bronze, No. 421, 39.25.

Magnesium Alloy Ingot: AZ63A, 34.00; AZ91B, 34.00; AZ91C, 34.00; AZ92A, 34.00.

NONFERROUS MILL PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb, f.o.b. Temple, Pa.; nominal 1.9% Be alloy) Strip, $1.84; rod, bar, wire, $1.81.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 30,000-lb lots, 51.355; l.c.l., 51.98. Weatherproof, 30,000-lb lots, 48.28; l.c.l., 49.03. Magnetic wire deld., 15,000 lb or more, 58.68; l.c.l., 59.43.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets, full rolls, 140 sq ft or more, $21.50 per cwt; pipe, full coils, $21.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $13.10-$13.60; sheared mill plate, $10.50-$12.00; strip, $13.10-$13.60; wire, $9.50-$11.50; forging billets, $7.90-$8.15; hot-rolled and forged bars, $7.90-$8.15.

ZINC

(Prices per lb, c.l., f.o.b. mill) Sheets, 23.00-24.00; ribbon zinc in coils, 21.50; plates, 20.00-22.25.

ZIRCONIUM

Plate, $22; H.R. strip, $19; C.R. strip, $29; forged or H.R. bars, $17; wire, 0.015 in., 1.00c per linear foot.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	102	83	99
Strip, C.R.	102	92	125
Plate, H.R.	97	87	95
Rod, Shapes, H.R.	87	74	93
Seamless Tubes	122	110	153
Shot, Blocks	...	71	...

ALUMINUM

Screw Machine Stock: 30,000 lb base.

Diam. (in.) or across flats	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
Drawn				
0.125	67.9	66.4	...	...
0.156-0.172	57.5	55.9	...	...
0.188	57.5	55.9	...	71.7
0.219-0.234	54.5	52.9	...	...
0.250-0.281	54.5	52.9	...	68.4
0.313	54.5	52.9	...	65.2
Cold-finished				
0.375-0.547	53.4	51.4	63.7	61.3
0.563-0.688	53.4	51.4	60.6	57.5
0.750-1.000	52.1	50.1	55.4	54.2
1.063	52.1	50.1	...	52.3
1.125-1.500	50.1	48.2	53.6	52.3
Rolled				
1.563	48.8	46.9	...	...
1.625-2.000	48.2	46.2	...	50.5
2.125-2.500	47.0	45.0	...	...
2.563-3.375	45.6	43.6	...	...

ALUMINUM

Sheet and Circle: 1100 and 3003 mill finish (30,000 lb base; freight allowed)

Thickness Range Inches	Flat Sheet	Flat Sheet Circles*	Coiled Sheet	Coiled Sheet Circles†
0.249-0.136	37.5	42.3	...	...
0.135-0.096	38.0	43.2	...	...
0.095-0.077	38.7	44.2	36.1	41.3
0.076-0.061	39.3	45.1	36.3	41.5
0.060-0.048	39.9	45.6	36.7	42.0
0.047-0.038	40.4	46.5	37.2	42.4
0.037-0.030	40.8	47.0	37.6	43.1
0.029-0.024	41.4	47.5	37.9	43.6
0.023-0.019	42.2	49.0	38.8	44.5
0.018-0.017	43.0	...	39.4	45.4
0.016-0.015	43.9	...	40.2	46.6
0.014	44.9	...	41.2	47.9
0.013-0.012	46.1	...	41.9	48.9
0.011	47.1	...	43.1	50.5
0.010-0.0095	48.4	...	44.3	52.2
0.009-0.0085	49.7	...	45.8	54.3
0.008-0.0075	51.3	...	47.0	56.1
0.007	52.8	...	48.5	58.4
0.006	54.4	...	49.9	63.4

*48 in. max diam. †26 in. max diam.

ALUMINUM

Plates and Circles: Thickness 0.250-3 in., 24-60 in. width or diam, 72-240 in. lengths.

Alloy	Plate Base	Circle Base
1100-F, 3003-F	36.5	40.8
5050-F	37.6	41.9
3004-F	38.6	43.8
5052-F	39.9	45.2
6061-T6	41.1	46.0
2024-T4*	43.6	49.9
7075-T6*	51.4	58.5

*24-48 in. widths or diam, 72-180 lengths.

ALUMINUM

Forging Stock: Round, Class 1, 39.10-50.10 in specific lengths 36-144 in., diameters 0.375-8 in. Rectangles and squares, Class 1, 43.00-56.20 in random lengths, 0.375-4 in. thick, width 0.750-10 in.

Pipe: ASA Schedule 40, alloy 6063-T6, 20-ft lengths, plain ends, 90,000-lb base, per 100 ft.

Nom. Pipe Size (in.)		Nom. Pipe Size (in.)	
¾	$16.85	2	$ 51.95
1	26.50	4	143.00
1¼	35.85	6	256.70
1½	42.90	8	386.30

MAGNESIUM

Sheet and Plate: AZ31A standard grade, .032 in., 99.00; .064 in., 78.00; .125 in., 63.50; .250-2.0 in., 61.00. AZ31A special grade, .032 in., 145.00; .064 in., 100.00; .125 in., 83.00; .250-2.0 in., 79.00. Tread plate, .125 in., 68.00; .250-3.0 in., 64.00. Tooling plate, .250-3.0 in., 65.00.

Extrusions		Com. Grade (FS)	Spec. Grade (AZ31B)
1 in. diam. rod		61.50	73.00
Shapes:	0.3 lb/ft	65.40-72.40	76.90-83.90
	1.0 lb/ft	61.90-67.30	73.40-78.80
	4.0 lb/ft	57.70-62.20	69.20-73.70
2 in. OD x ⅛ in. w. tubing		74.50	86.00

NONFERROUS SCRAP

DEALERS BUYING PRICES

(Cents per pound, New York, in ton lots)

Aluminum: 1100 clippings, 20.00-20.50; old sheets, 17.00-17.50; borings and turnings, 11.00-11.50; crankcases, 17.00-17.50; industrial castings, 17.00-17.50.

Copper and Brass: No. 1 heavy copper and wire, 43.00-44.00; No. 2 heavy copper and wire, 41.00-41.50; light copper, 39.00-39.50; No. 1 composition red brass, 33.50-34.00; No. 1 composition turnings, 31.00-31.50; yellow brass

BRASS MILL PRICES

	MILL PRODUCTS a				SCRAP ALLOWANCES f		
	Sheet, Strip, Plate	Rod	Wire	Seamless Tube	Clean Heavy	Rod Ends	Clean Turnings
Copper	67.13b	64.38c	....	67.32	42.000	42.000	41.250
Yellow Brass	55.60	45.65d	56.14	58.81	31.250	31.000	29.000
Low Brass, 80%	60.15	60.09	60.69	62.96	35.375	35.125	34.625
Red Brass, 85%	61.79	61.73	62.33	64.60	37.000	36.750	36.250
Com. Bronze, 90%	63.98	63.92	64.52	66.54	38.500	38.250	37.750
Manganese Bronze	62.64–62.75	56.65–56.74	67.09	.....	29.250	29.000	28.500
Muntz Metal	56.94	52.75	....	....	29.125	28.875	28.375
Naval Brass	58.90	53.21	65.96	62.06	29.000	28.750	28.250
Silicon Bronze	70.48	69.67	70.52	72.66e	40.750	40.500	39.750
Nickel Silver, 10%	69.20	71.53g	51.53	....	34.625	34.375	17.313
Phos. Bronze, A, 5%	85.37	85.87	85.87	87.05	42.625	42.375	41.375

a. Cents per lb, f.o.b. mill; freight allowed on 500 lb or more. b. Hot-rolled. c. Cold-drawn. d. Free cutting. e. 3% silicon. f. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time, of any or all kinds of scrap, add 1 cent per lb. g. Leaded

turnings, 19.50-20.50; new brass clippings, 28.00-28.50; light brass, 19.50-20.50; heavy yellow brass, 22.00-23.00; new brass rod ends, 27.00-27.50; auto radiators, unsweated, 25.50-26.00; cocks and faucets, 27.00-28.00; brass pipe, 27.00-28.00.

Lead: Heavy, 12.75-13.00; battery plates, 6.50-6.75; linotype and stereotype, 14.00-14.50; electrotype, 13.25-13.75; mixed babbitt, 15.50.

Magnesium: Clippings, 18.50-19.50; clean castings, 18.00-19.00; iron castings, not over 10% removable Fe, less full deduction for Fe, 16.00-17.00.

Monel: Clippings, 60.00-65.00; old sheets, 55.00-65.00; turnings, 50.00; rods, 60.00-65.00.

Nickel: Sheets and clips, 100.00-150.00; rolled anodes, 100.00-150.00; turnings, 85.00-125.00; rod ends, 100.00-150.00.

Zinc: Old zinc, 6.00-6.50; new die-cast scrap, 6.00; old die-cast scrap, 3.50.

REFINER'S BUYING PRICES

(Cents per pound, carlots, delivered refinery)

Aluminum: 1100 clippings, 22.25-22.50; 3003 clippings, 22.00-22.50; 6151 clippings, 21.75-22.25; 5052 clippings, 21.75-22.25; 2014 clippings, 21.75; 2017 clippings, 21.50-21.75; 2024 clippings, 21.50-21.75; mixed clippings, 21.00-22.00; old sheet, 19.50-20.00; old cast, 19.50-20.00, clean old cable (free of steel), 21.75-22.25; borings and turnings, 19.50-20.50.

Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 68.00; light scrap, 63.00; turnings and borings, 48.00.

Copper and Brass: No. 1 heavy copper and wire, 46.00; No. 2 heavy copper and wire, 43.50; light copper, 42.00; refinery brass (60% copper) per dry copper content, 39.50.

INGOTMAKERS' BUYING PRICES

(Cents per pound, carlots, delivered)

Copper and Brass: No. 1 heavy copper and wire, 46.00; No. 2 heavy copper and wire, 43.50; light copper, 42.00; No. 1 composition borings, 35.50; No. 1 composition solids, 36.00; heavy yellow brass solids, 26.00; yellow brass turnings, 25.00; radiators, 27.50-28.00.

PLATING MATERIAL

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.70 per lb.

Copper: Flat-rolled, 63.79; oval, 62.92, 5000-10,000 lb; electrodeposited, 61.25, 2000-5000 lb lots; cast, 58.85, 5000-10,000 lb quantities.

Nickel: Depolarized, less than 100 lb, $1.015; 100-499 lb, 99.50; 500-4999 lb, 95.50; 5000-29,999 lb, 93.50; 30,000 lb, 91.50. Carbonized, deduct 3 cents a lb. All prices eastern delivery, effective Jan. 1, 1955.

Tin: Bar or slab; less than 200 lb, $1.205; 200-499 lb, $1.190; 500-999 lb, $1.185; 1000 lb or more, $1.180.

Zinc: Balls, 21.00; flat tops, 21.00; flats, 22.75; ovals, 22.00, ton lots.

CHEMICALS

Cadmium Oxide: $2.15 per lb, in 100-lb drums.

Chromic Acid: Less than 10,000 lb, 28.50; over 10,000 lb, 27.50.

Copper Cyanide: 100 lb, 85.25; 200 lb, 84.50; 300 lb, 84.25; 400-900 lb, 85.50; 1000 lb, 81.50.

Copper Sulphate: 500-1900 lb, 17.90; 2000-5900 lb, 15.90; 6000 lb or more, 15.65.

Nickel Chloride: 100 lb, 46.50; 200 lb, 44.50; 300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 39.50; 10,000 lb and over, 38.50. All prices eastern delivery, effective Jan. 1, 1955.

Nickel Sulphate: 100 lb, 38.25; 200 lb, 36.25; 3300 lb, 35.25; 400-4900 lb, 33.25; 5000-35,900 lb, 31.25; 36,000 lb, 30.25. All prices eastern delivery, effective Jan. 1, 1955.

Silver Cyanide: (Cents per ounce) 4-oz bottle, 86.875; 16-oz bottle, 85.625; 80-oz bottle, 83.125; 100-oz bottle, 83.125; f.o.b. St. Louis, New York and Los Angeles. Effective Sept. 30, 1955.

Sodium Cyanide: Egg, under 1000 lb, 19.80; 1000-19,900 lb, 18.80; 20,000 lb, and over, 17.80; granular, add 1-cent premium to above.

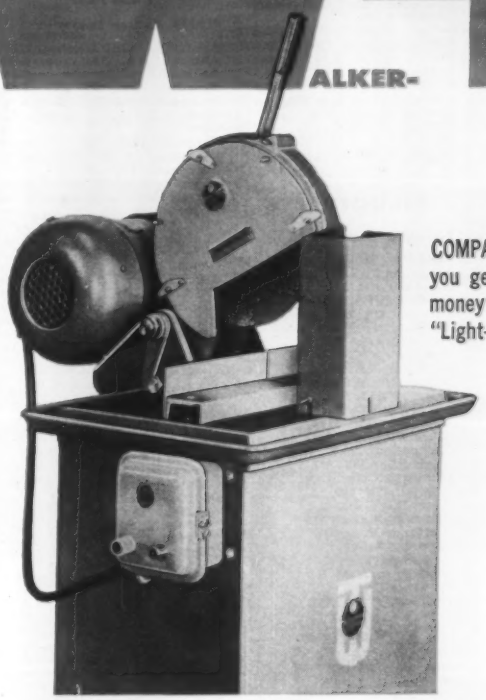
Sodium Stannate: Less than 100 lb, 72.30; 100-600 lb, 63.80; 700-1900 lb, 61.30; 2000-9900 lb, 59.60; 10,000 lb or more, 58.40.

Stannous Chloride (anhydrous): Less than 25 lb, $1.696; 25 lb, $1.346; 100 lb, $1.196; 400 lb, $1.171; 5200-19,600 lb, $1.049; 20,000 lb or more, 92.70.

Stannous Sulphate: Less than 50 lb, $1.322; 50 lb, $1.022; 100-1900 lb, $1.002; 2000 lb or more, 98.20.

Zinc Cyanide: Under 1000 lb, 54.30; 1000 lb and over, 52.30.

W-T WALKER-TURNER



COMPARE — You'll see that you get a lot more for your money when you buy W-T "Light-Heavyweights"!

Another NEW "Light-Heavyweight"! — cuts bars, rods, tubing . . . and production time!

This newest machine in Walker-Turner's "LIGHT-HEAVYWEIGHT" line makes mighty short work of cutting bars, rods and tubing. The abrasive wheel cuts true and clean — saves time for you with every cut it makes and frequently eliminates finishing operations.

You can tap the cast-iron table to mount any work-holding devices you want. We furnish a template to drill for angle-mounting of the head — or it can be factory-mounted at 45° for miter cutting.

Walker-Turner "Light-Heavyweight" Abrasive Cut-Off Machine: Capacity: 1-1/2" round bar; 3" tubing. Abrasive wheel, 12" dia. x 3/32", on 1" spindle. Speed, 3720 rpm, 11,710 fpm. Heavy guard provides 216° peripheral protection; easily removed for wheel change. 3 hp. 220/440 v. 3-phase motor — fan-cooled, totally enclosed, ball-bearing, overload capacity up to 7 hp.

Available mounted at 45°

Ask your Walker-Turner Distributor to demonstrate what this new Cut-Off Machine will do for you. He's listed under "Tools" in your phone book's Yellow Pages. Or write for his name and complete specifications.

DRILL PRESSES, HAND AND POWER FEED — AIR FEED DRILL PRESS ATTACHMENT
RADIAL DRILLS — WOOD AND METAL CUTTING BAND SAWS — TILTING ARBOR SAWS
RADIAL SAWS — JIG SAWS — CUT-OFF SAWS — LATHES — SPINDLE SHAPERS
JOINTERS — BELT AND DISC SURFACERS — FLEXIBLE SHAFT MACHINES

walker-Turner

WALKER-TURNER
Division
Kearney And Trecker Corporation • Plainfield, N. J.

Steel Prices

Mill prices as reported to STEEL, cents per pound except as otherwise noted. *Changes shown in italics.* Code numbers following mill points indicate producing company. Key to producers, page 227; to footnotes, page 229.

SEMIFINISHED

INGOTS, Carbon, Forging (NT)

Munhall,Pa. U5 ..... $65.50

INGOTS, Alloy (NT)

Detroit R7 ..... $69.00
Houston S5 ..... 74.00
Midland,Pa. C18 ..... 69.00
Munhall,Pa. U5 ..... 69.00

BILLETS, BLOOMS & SLABS

Carbon, Rerolling (NT)

Aliquippa,Pa. J5 ..... $68.50
Bessemer,Pa. U5 ..... 68.50
Bridgeport,Conn. N19 .. 73.50
Buffalo R2 ..... 68.50
Clairton,Pa. U5 ..... 68.50
Ensley,Ala. T2 ..... 68.50
Fairfield,Ala. T2 ..... 68.50
Fontana,Calif. K1 ..... 76.00
Gary,Ind. U5 ..... 68.50
Johnstown,Pa. B2 ..... 68.50
Lackawanna,N.Y. B2 .. 68.50
LoneStar,Tex. L6 ..... 74.50
Munhall,Pa. U5 ..... 68.50
Pittsburgh J5 ..... 68.50
S.Chicago,Ill. R2, U5 .. 68.50
S.Duquesne,Pa. U5 .... 68.50
Youngstown R2 ..... 68.50

Carbon, Forging (NT)

Aliquippa,Pa. J5 ..... $84.50
Bessemer,Pa. U5 ..... 84.50
Bridgeport,Conn. N19 .. 89.50
Buffalo R2 ..... 84.50
Canton,O. R2 ..... 86.50
Clairton,Pa. U5 ..... 84.50
Conshohocken,Pa. A3 .. 89.50
Ensley,Ala. T2 ..... 84.50
Fairfield,Ala. T2 ..... 84.50
Fontana,Calif. K1 .... 92.00
Gary,Ind. U5 ..... 84.50
Geneva,Utah C11 ..... 84.50
Houston S5 ..... 89.50
Johnstown,Pa. B2 .... 84.50
Lackawanna,N.Y. B2 .. 84.50
LosAngeles B3 ..... 94.00
Midland,Pa. C18 ..... 84.50
Munhall,Pa. U5 ..... 84.50
Pittsburgh J5 ..... 84.50
Seattle B3 ..... 98.00
S.Chicago R2,U5,W14 .. 84.50
S.Duquesne,Pa. U5 .... 84.50
S.SanFrancisco B3 .... 94.00

Alloy, Forging (NT)

Bethlehem,Pa. B2 .... $96.00
Buffalo R2 ..... 96.00
Canton,O. R2, T7 ..... 96.00
Conshohocken,Pa. A3 .. 103.00
Detroit R7 ..... 96.00
Fontana,Calif. K1 .... 115.00
Gary,Ind. U5 ..... 96.00
Houston S5 ..... 101.00
Ind.Harbor,Ind. Y1 .... 96.00
Johnstown,Pa. B2 .... 96.00
Lackawanna,N.Y. B2 .. 96.00
LosAngeles B3 ..... 116.00
Massillon,O. R2 ..... 96.00
Midland,Pa. C18 ..... 96.00
Munhall,Pa. U5 ..... 96.00
S.Chicago R2,U5,W14 .. 96.00
S.Duquesne,Pa. U5 .... 96.00
Struthers,O. Y1 ..... 96.00
Warren,O. C17 ..... 96.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 ..... $103.50
Canton,O. R2 ..... 103.50
Cleveland R2 ..... 103.50
Gary,Ind. U5 ..... 103.50
S.Chicago R2, W14 .. 103.50
S.Duquesne,Pa. U5 .. 103.50

SKELP

Aliquippa,Pa. J5 ..... 4.325
LoneStar,Tex. L6 .... 4.625
Munhall,Pa. U5 ..... 4.225
SparrowsPoint,Md. B2 .. 4.225
Warren,O. R2 ..... 4.225
Youngstown R2, U5 .. 4.225

WIRE RODS

AlabamaCity,Ala. R2 .. 5.375
Aliquippa,Pa. J5 ..... 5.375
Alton,Ill. L1 ..... 5.55
Buffalo W12 ..... 5.375
Cleveland A7 ..... 5.375
Donora,Pa. A7 ..... 5.375
Fairfield,Ala. T2 ..... 5.375
Houston S5 ..... 5.625
IndianaHarbor,Ind. Y1 5.375
Johnstown,Pa. B2 ..... 5.375
Joliet,Ill. A7 ..... 5.375
KansasCity,Mo. S5 .... 5.625
Kokomo,Ind. C16 ..... 5.475
LosAngeles B3 ..... 6.175
Minnequa,Colo. C10 ... 5.625
Monessen,Pa. P7 ..... 5.375
N.Tonawanda,N.Y. B11 5.375
Pittsburg,Calif. C11 ... 5.675
Portsmouth,O. P12 .... 5.375
Roebling,N.J. R5 ..... 5.475
S.Chicago,Ill. R2 ..... 5.375
SparrowsPoint,Md. B2.. 5.475
Sterling,Ill.(1) N15 ... 5.375
Sterling,Ill. N15 ..... 5.475
Struthers,O. Y1 ..... 5.375
Worcester,Mass. A7 ... 5.675

STRUCTURALS

Carbon Steel Std. Shapes

Ala.City,Ala. R2 ..... 4.60
Aliquippa,Pa. J5 ..... 4.60
Bessemer,Ala. T2 ..... 4.60
Bethlehem,Pa. B2 ..... 4.65
Birmingham C15 ..... 5.10
Clairton,Pa. U5 ..... 4.60
Fairfield,Ala. T2 ..... 4.60
Fontana,Calif. K1 ..... 5.25
Gary,Ind. U5 ..... 4.60
Geneva,Utah C11 ..... 4.60
Houston S5 ..... 4.70
Ind.Harbor,Ind. I-2 .... 4.60
Johnstown,Pa. B2 ..... 4.65
KansasCity,Mo. S5 ..... 4.70
Lackawanna,N.Y. B2 .. 4.65
LosAngeles B3 ..... 5.30
Minnequa,Colo. C10 .... 4.90
Munhall,Pa. U5 ..... 4.60
Niles,Calif. P1 ..... 5.25
Phoenixville,Pa. P4 .... 5.15
Portland,Oreg. O4 ..... 5.35
Seattle B3 ..... 5.35
S.Chicago U5, W14 .... 4.60
S.SanFrancisco B3 .... 5.25
Torrance,Calif. C11 .... 5.30
Weirton,W.Va. W6 .... 4.60

Wide Flange

Bethlehem,Pa. B2 ..... 4.65
Clairton,Pa. U5 ..... 4.60
Fontana,Calif. K1 ..... 5.40
Lackawanna,N.Y. B2 .. 4.65
Munhall,Pa. U5 ..... 4.60
Phoenixville,Pa. P4 .... 5.15
S.Chicago,Ill. U5 ..... 4.60

Alloy Std. Shapes

Clairton,Pa. U5 ..... 5.65
Fontana,Calif. K1 ..... 7.30
Gary,Ind. U5 ..... 5.65
Houston S5 ..... 5.75
Munhall,Pa. U5 ..... 5.65
S.Chicago,Ill. U5 ..... 5.65

H.S., L.A. Std. Shapes

Aliquippa,Pa. J5 ..... 6.75
Bessemer,Ala. T2 ..... 6.75
Bethlehem,Pa. B2 ..... 6.80
Clairton,Pa. U5 ..... 6.75
Fairfield,Ala. T2 ..... 6.75
Fontana,Calif. K1 ..... 7.40
Gary,Ind. U5 ..... 6.75
Geneva,Utah C11 ..... 6.75
Houston S5 ..... 6.85
Ind.Harbor,Ind. I-2, Y1. 6.75
Johnstown,Pa. B2 ..... 6.80
KansasCity,Mo. S5 .... 6.85
Lackawanna,N.Y. B2 .. 6.80
LosAngeles B3 ..... 7.45
Munhall,Pa. U5 ..... 6.75
Seattle B3 ..... 7.50
S.Chicago,Ill. U5, W14.. 6.75
S.SanFrancisco B3 .... 7.40
Struthers,O. Y1 ..... 6.75

H.S., L.A. Wide Flange

Bethlehem,Pa. B2 ..... 6.80
Lackawanna,N.Y. B2 .. 6.80
Munhall,Pa. U5 ..... 6.75
S.Chicago,Ill. U5 ..... 6.75

PILING

BEARING PILES

Bethlehem,Pa. B2 ..... 4.65
Lackawanna,N.Y. B2 .. 4.65
Munhall,Pa. U5 ..... 4.60
S.Chicago,Ill. U5 ..... 4.60

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 .... 5.45
Lackawanna,N.Y. B2 .. 5.45
Munhall,Pa. U5 ..... 5.45
S.Chicago,Ill. U5 ..... 5.45

PLATES

PLATES, Carbon Steel

Ala.City,Ala. R2 ..... 4.50
Aliquippa,Pa. J5 ..... 4.50
Ashland,Ky.(15) A10 ... 4.50
Bessemer,Ala. T2 ..... 4.50
Bridgeport,Conn. N19 .. 4.75
Buffalo R2 ..... 4.50
Clairton,Pa. U5 ..... 4.50
Claymont,Del. C22 ..... 4.80
Cleveland J5, R2 ..... 4.60
Coatesville,Pa. L7 ..... 4.80
Conshohocken,Pa. A3 ... 4.50
Detroit M1 ..... 4.60
Ecorse,Mich. G5 ..... 4.60
Fairfield,Ala. T2 ..... 4.50
Fontana,Calif.(30) K1 .. 5.15
Gary,Ind. U5 ..... 4.50
Geneva,Utah C11 ..... 4.50
GraniteCity,Ill. G4 ..... 4.70
Harrisburg,Pa. P4 ..... 5.10
Houston S5 ..... 4.60
Ind.Harbor,Ind. I-2, Y1. 4.50
Johnstown,Pa. B2 ..... 4.50
Lackawanna,N.Y. B2 .. 4.50
LoneStar,Tex. L6 ..... 4.85
Mansfield,O. E6 ..... 4.50
Minnequa,Colo. C10 .... 5.35
Munhall,Pa. U5 ..... 4.50
Newport,Ky. N9 ..... 4.50
Pittsburgh J5 ..... 4.50
Riverdale,Ill. A1 ..... 4.725
Seattle B3 ..... 5.40
Sharon,Pa. S3 ..... 4.50
S.Chicago R2, U5, W14 .. 4.50
SparrowsPoint,Md. B2 .. 4.50
Steubenville,O. W10 .... 4.50
Warren,O. R2 ..... 4.50
Weirton,W.Va. W6 ..... 4.50
Youngstown R2, U5, Y1. 4.50

PLATES, Carbon Abras. Resist.

Claymont,Del. C22 ..... 5.65
Fontana,Calif. K1 ..... 6.30
Geneva,Utah C11 ..... 5.65
Johnstown,Pa. B2 ..... 5.65
SparrowsPoint,Md. B2 .. 5.65

PLATES, Wrought Iron

Economy,Pa. B14 ..... 10.40

PLATES, High Strength Low-Alloy

Aliquippa,Pa. J5 ..... 6.725
Bessemer,Ala. T2 ..... 6.725
Clairton,Pa. U5 ..... 6.725
Cleveland J5, R2 ..... 6.725
Claymont,Del. C22 .... 6.725
Coatesville,Pa. L7 ..... 7.025
Conshohocken,Pa. A3 .. 6.725
Ecorse,Mich. G5 ..... 6.825
Fairfield,Ala. T2 ..... 6.725
Fontana,Calif.(30) K1.. 7.375
Gary,Ind. U5 ..... 6.725
Geneva,Utah C11 ..... 6.725
Houston S5 ..... 6.825
Ind.Harbor,Ind. I-2, Y1. 6.725
Johnstown,Pa. B2 ..... 6.725
Munhall,Pa. U5 ..... 6.725
Pittsburgh J5 ..... 6.725
Seattle B3 ..... 7.625
Sharon,Pa. S3 ..... 6.725
S.Chicago,Ill. U5, W14. 6.725
SparrowsPoint,Md. B2.. 6.725
Warren,O. R2 ..... 6.725
Youngstown U5, Y1 ... 6.725

PLATES, Alloy

Bridgeport,Conn. N19 .... 6.55
Claymont,Del. C22 ..... 6.30
Coatesville,Pa. L7 ..... 6.30
Fontana,Calif. K1 ..... 6.95
Gary,Ind. U5 ..... 6.30
Houston S5 ..... 6.40
Ind.Harbor,Ind. Y1 .... 6.30
Johnstown,Pa. B2 ..... 6.30
Munhall,Pa. U5 ..... 6.30
Newport,Ky. N9 ..... 6.30
Seattle B3 ..... 7.20
Sharon,Pa. S3 ..... 6.30
S.Chicago,Ill. U5, W14.. 6.30
SparrowsPoint,Md. B2 .. 6.30
Youngstown Y1 ..... 6.30

FLOOR PLATES

Cleveland J5 ..... 5.575
Conshohocken,Pa. A3 .. 5.575
Harrisburg,Pa. P4 .... 5.575
Ind.Harbor,Ind. I-2 ... 5.575
Munhall,Pa. U5 ..... 5.575
S.Chicago,Ill. U5 ..... 5.575

PLATES, Ingot Iron

Ashland c.l. (15) A10.. 4.75
Ashland l.c.l. (15) A10.. 5.25
Cleveland c.l. R2 ..... 5.10
Warren,O. c.l. R2 ..... 5.10

BARS

(Commerical Quality)

BARS, Hot-Rolled Carbon

Ala.City,Ala.(9) R2 .... 4.65
Aliquippa,Pa.(9) J5 .... 4.65
Alton,Ill. L1 ..... 4.85
Atlanta A11 ..... 4.85
Bessemer,Ala.(9) T2 ... 4.65
Birmingham C15 ..... 5.15
Bridgeport,Conn. N19 .. 4.80
Buffalo(9) R2 ..... 4.65
Canton,O.(9) R2 ..... 4.75
Clairton,Pa.(9) U5 .... 4.65
Cleveland(9) R2 ..... 4.65
Ecorse,Mich. G5 ..... 4.75
Emeryville,Calif. J7 .... 5.40
Fairfield,Ala.(9) T2 .... 4.65
Fairless,Pa.(9) U5 .... 4.80
Fontana,Calif. K1 ..... 5.35
Gary,Ind.(9) U5 ..... 4.65
Houston(9) S5 ..... 4.90
Ind.Harbor,Ind.(9) I-2.. 4.65
Ind.Harbor,Ind. Y1 .... 4.65
Johnstown,Pa.(9) B2 .. 4.65
Joliet,Ill. P22 ..... 5.15
KansasCity,Mo.(9) S5 .. 4.90
Lackawanna (9) B2 .... 4.65
LosAngeles (9) B3 .... 5.35
Massillon,O.(9) R2 .... 4.75
Midland,Pa. (9) C18 .. 4.65
Milton,Pa. M18 ..... 4.80
Minnequa,Colo. C10 .... 5.10
Niles,Calif. P1 ..... 5.35
N.Tonawanda,N.Y.(9) B11 4.65
Pittsburg,Calif.(9) C11.. 5.35
Pittsburgh(9) J5 ..... 4.65
Portland,Oreg. O4 ..... 5.40
Seattle B3, N14 ..... 5.40
S.Chicago W14 ..... 4.65
S.Chicago,Ill.(9) R2, U5 4.65
S.Duquesne,Pa.(9) U5.. 4.65
S.SanFran.,Calif.(9) B3 5.40
Sterling,Ill.(1) N15 .... 4.85
Sterling,Ill. N15 ..... 4.75
Struthers,O. Y1 ..... 4.65
Torrance,Calif.(9) C11 .. 5.35
Warren,O.(9) R2 ..... 4.65
Weirton,W.Va.(9) W6 .. 4.65
Youngstown(9) R2 U5.. 4.65

BARS, H.R. Leaded Alloy

Warren,O. C17 ..... 6.575

BARS, Hot-Rolled Alloy

Bethlehem,Pa. B2 .... 5.575
Bridgeport,Conn. N19.. 5.725
Buffalo R2 ..... 5.575
Canton,O. R2, T7 ..... 5.575
Clairton,Pa. U5 ..... 5.575
Detroit R7 ..... 5.575
Ecorse,Mich. G5 ..... 5.675
Fairless,Pa. U5 ..... 5.725
Fontana,Calif. K1 .... 6.625
Gary,Ind. U5 ..... 5.575
Houston S5 ..... 5.825
Ind.Harbor,Ind. I-2, Y1. 5.575
Johnstown,Pa. B2 .... 5.575
KansasCity,Mo. S5 .... 5.825
Lackawanna,N.Y. B2 .. 5.575
LosAngeles B3 ..... 6.625
Massillon,O. R2 ..... 5.575
Midland,Pa. C18 ..... 5.575
S.Chicago R2, U5, W14. 5.575
S.Duquesne,Pa. U5 .... 5.575
Struthers,O. Y1 ..... 5.575
Warren,O. C17 ..... 5.575
Youngstown U5 ..... 5.575

BARS & SMALL SHAPES, H.R. High-Strength Low-Alloy

Aliquippa,Pa. J5 ..... 6.80
Bessemer,Ala. T2 ..... 6.80
Bethlehem,Pa. B2 ..... 6.80
Clairton,Pa. U5 ..... 6.80
Cleveland R2 ..... 6.80
Ecorse,Mich. G5 ..... 6.90
Fairfield,Ala. T2 ..... 6.80
Fontana,Calif. K1 ..... 7.50
Gary,Ind. U5 ..... 6.80
Houston S5 ..... 7.05
Ind.Harb.,Ind. I-2, Y1.. 6.80
Johnstown,Pa. B2 ..... 6.80
KansasCity,Mo. S5 .... 7.05
Lackawanna,N.Y. B2 .. 6.80
LosAngeles B3 ..... 7.50
Pittsburgh J5 ..... 6.80
Seattle B3 ..... 7.55
S.Chicago W14 ..... 6.80
S.Duquesne,Pa. U5 .... 6.80
S.SanFrancisco B3 .... 7.55
Struthers,O. Y1 ..... 6.80
Warren,O. R2 ..... 6.80
Youngstown U5 ..... 6.80

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 .. 4.80
Lackawanna (9) B2 .... 4.65

BAR SIZE ANGLES; S. Shapes

Aliquippa,Pa. J5 ..... 4.65
Atlanta A11 ..... 4.85
Fontana,Calif. K1 ..... 5.35
Joliet,Ill. P22 ..... 5.10
Niles,Calif. P1 ..... 5.35
Pittsburgh J5 ..... 4.65
Portland,Oreg. O4 ..... 5.40
SanFrancisco S7 ..... 5.05

BAR SHAPES, Hot-Rolled Alloy

Clairton,Pa. U5 ..... 5.65
Gary,Ind. U5 ..... 5.65
Houston S5 ..... 5.90
KansasCity,Mo. S5 .... 5.90
Youngstown U5 ..... 5.65

BARS, C.F. Leaded Alloy

Ambridge,Pa. W18 .... 8.325
Camden,N.J. P13 ..... 8.35
Chicago W18 ..... 8.325
Cleveland C20 ..... 8.325
Monaca,Pa. S17 ..... 8.325
Newark,N.J. W18 ..... 8.50
SpringCity,Pa. K3 .... 8.30
Warren,O. C17 ..... 8.575

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 .... 6.25
BeaverFalls,Pa. M12,R2 6.25
Buffalo B5 ..... 6.30
Camden,N.J. P13 ..... 6.70
Carnegie,Pa. C12 ..... 6.25
Chicago W18 ..... 6.25
Cleveland A7, C20 .... 6.25
Detroit B5 ..... 6.45
Detroit P17, R7 ..... 6.25
Donora,Pa. A7 ..... 6.25
Elyria,O. W8 ..... 6.25
FranklinPark,Ill. N5 .. 6.25
Gary,Ind. R2 ..... 6.25
GreenBay,Wis. F7 .... 6.25
Hammond,Ind. L2, M13. 6.25
Hartford,Conn. R2 .... 6.75
Harvey,Ill. B5 ..... 6.25
LosAngeles(49) S30 .... 7.70
LosAngeles R2 ..... 7.70
Mansfield,Mass. B5 .... 6.80
Massillon,O. R2, R8 .... 6.25
Midland,Pa. C18 ..... 6.25
Monaca,Pa. S17 ..... 6.25
Newark,N.J. W18 ..... 6.70
NewCastle,Pa.(17) B4.. 6.25
Pittsburgh J5 ..... 6.25
Plymouth,Mich. P5 .... 6.50
Putnam Conn. W18 .... 6.80
Readville,Mass. C14 .. 6.80
S.Chicago,Ill. W14 .... 6.25
SpringCity,Pa. W3 .... 6.70
Struthers,O. Y1 ..... 6.25
Waukegan,Ill. A7 ..... 6.25
Worcester,Mass. W19 .. 6.70
Youngstown F3, Y1 .... 6.25

BARS, Cold-Finished Carbon (Turned and Ground)

Cumberland,Md.(5) C19.. 5.16

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 .... 7.425
BeaverFalls,Pa. M12,R2 7.425
Bethlehem,Pa. B2 ..... 7.425
Buffalo B5 ..... 7.425
Camden,N.J. P13 ..... 7.60
Canton,O. T7 ..... 7.425
Carnegie,Pa. C12 ..... 7.425
Chicago W18 ..... 7.425
Cleveland A7, C20 .... 7.425
Detroit R7 ..... 7.425
Detroit B5, P17 ..... 7.625
Donora,Pa. A7 ..... 7.425
Elyria,O. W8 ..... 7.425
Gary,Ind. R2 ..... 7.425
GreenBay,Wis. F7 .... 7.425
Hammond,Ind. L2, M13. 7.425
Hartford,Conn. R2 .... 7.725
Harvey,Ill. B5 ..... 7.425
Lackawanna,N.Y. B2 .. 7.425
LosAngeles S30 ..... 9.10
Mansfield,Mass. B5 .... 7.725
Massillon,O. R2, R8 .... 7.425
Midland,Pa. C18 ..... 7.425
Monaca,Pa. S17 ..... 7.425
Newark,N.J. W18 ..... 7.60
Plymouth,Mich. P5 .... 7.625
S.Chicago W14 ..... 7.425
SpringCity,Pa. K3 ..... 7.60
Struthers,O. Y1 ..... 7.425
Warren,O. C17 ..... 7.425
Waukegan,Ill. A7 ..... 7.425
Worcester,Mass. A7 .... 7.725
Youngstown F3, Y1 .... 7.425

BARS, Reinforcing (To Fabricators)

Ala.City,Ala. R2 ..... 4.65
Atlanta A11 ..... 4.85
Birmingham C15 ..... 5.15
Buffalo R2 ..... 4.65
Cleveland R2 ..... 4.65
Ecorse,Mich. G5 ..... 4.75
Emeryville,Calif. J7 .... 5.40
Fairfield,Ala. T2 ..... 4.65
Fairless,Pa. U5 ..... 4.80
Fontana,Calif. K1 ..... 5.35
Ft.Worth,Tex.(42) T4 .. 5.10
Gary,Ind. U5 ..... 4.65
Houston S5 ..... 4.90

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

Ala. City, Ala. R2 .....4.325
Allenport, Pa. P7 .....4.325
Ashland, Ky. (8) A10 ..4.325
Cleveland J5, R2 .....4.325
Conshohocken, Pa. A3 ..4.375
Detroit (8) M1 .....4.425
Dravosburg, Pa. U5 .....4.325
Ecorse, Mich. G5 .....4.425
Fairfield, Ala. T2 .....4.325
Fairless, Pa. U5 .....4.375
Fontana, Calif. K1 ....5.075
Gary, Ind. U5 .....4.325
Geneva, Utah C11 .....4.425
GraniteCity, Ill. G4 ....4.525
Ind. Harbor, Ind. I-2, Y1 4.325
Lackawanna, N.Y. B2 ..4.325
Mansfield, O. E6 (37) ..4.325
Munhall, Pa. U5 .....4.325
Newport, Ky. (8) N9 ...4.325
Niles, O. M21 .....4.325
Pittsburg, Calif. C11 ...5.025
Pittsburgh J5 .....4.325
Portsmouth, O. P12 ....4.325
Riverdale, Ill. A1 .....4.55
Sharon, Pa. S3 .....4.325
S. Chicago, Ill. W14 ....4.325
SparrowsPoint, Md. B2.4.325
Steubenville, O. W10 ...4.325
Warren, O. R2 .....4.325
Weirton, W. Va. W6 ....4.325
Youngstown U5, Y1 ...4.325

SHEETS, H.R. (19 Ga. & Lighter)

Ala. City, Ala. R2 ....5.625
Niles, O. M21 .....5.325

SHEETS, H.R. Alloy

Ind. Harbor, Ind. Y1 ....7.20
Youngstown Y1 .....7.20

SHEETS, H.R. (14 Ga. & Heavier) High-Strength Low-Alloy

Cleveland J5, R2 .....6.375
Conshohocken, Pa. A3 ..6.425
Dravosburg, Pa. U5 ...6.375
Ecorse, Mich. G5 .....6.475
Fairfield, Ala. T2 .....6.375
Fairless, Pa. U5 .....6.425
Fontana, Calif. K1 .....7.125
Gary, Ind. U5 .....6.375
Ind. Harbor, Ind. I-2, Y1.6.375
Lackawanna (35) B2 ..6.375
Munhall, Pa. U5 .....6.375
Pittsburgh J5 .....6.375
Sharon, Pa. S3 .....6.375
S. Chicago, Ill. U5 .....6.375
SparrowsPoint (36) B2.6.375
Warren, O. R2 .....6.375
Weirton, W. Va. W6 ....6.375
Youngstown U5, Y1 ...6.375

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland, Ky. (8) A10 ...4.575
Ind. Harbor, Ind. I-2 ...4.575

SHEETS, Cold-Rolled Steel (Commercial Quality)

Allenport, Pa. P7 ....5.325
Cleveland J5, R2 .....5.325
Conshohocken, Pa. A3 ..5.375
Dravosburg, Pa. U5 ....5.325
Detroit M1 .....5.325
Ecorse, Mich. G5 .....5.425
Fairfield, Ala. T2 .....5.325
Fairless, Pa. U5 .....5.375
Follansbee, W. Va. F4 ..5.325
Fontana, Calif. K1 ....6.425
Gary, Ind. U5 .....5.325
GraniteCity, Ill. G4 ....5.525
Ind. Harbor, Ind. I-2, Y1.5.325
Lackawanna, N.Y. B2 ..5.325
Mansfield, O. E6 .....5.325
Middletown, O. A10 ....5.325
Newport, Ky. N9 .....5.325
Pittsburg, Calif. C11 ..6.275
Pittsburgh J5 .....5.325
Portsmouth, O. P12 ....5.325
SparrowsPoint, Md. B2..5.325
Steubenville, O. W10 ...5.325
Warren, O. R2 .....5.325
Weirton, W. Va. W6 ....5.325
Youngstown Y1 .....5.325

SHEETS, Cold-Rolled High-Strength Low-Alloy

Cleveland J5, R2 .....7.875
Dravosburg, Pa. U5 ...7.875
Ecorse, Mich. G5 .....7.975
Fairless, Pa. U5 .....7.925
Fontana, Calif. K1 ....8.975
Gary, Ind. U5 .....7.875
IndianaHarbor, Ind. Y1.7.875
Lackawanna (37) B2 ..7.875
Pittsburgh J5 .....7.875
SparrowsPoint (38) B2..7.875
Warren, O. R2 .....7.875
Weirton, W. Va. W6 ....7.875
Youngstown Y1 .....7.875

SHEETS, Cold-Rolled Ingot Iron

Middletown, O. A10 ....5.825

SHEETS, Culvert (16 Gage)	Cu Alloy	Cu Fe
Ashland, Ky.	A10 6.90	...
Canton, O.	R2 6.10	6.55
Dravosburg	U5 6.10	...
Fairfield	T2 6.10	...
Gary, Ind.	U5 6.10	6.35
Ind. Harbor	I-2 6.10	6.35
Kokomo, Ind.	C16 6.20	...
MartinsFry.	W10 6.10	...
Newport, Ky.	N9 6.10	6.35
Pitts., Calif.	C11 6.85	...
SparrowsPt.	B2 6.10	...

SHEETS, Culvert—Pure Iron

Ashland, Ky. A10 .....7.15
Gary, Ind. U5 .....6.35
MartinsFry, O. W10 ....6.35

SHEETS, Galvanized Steel Hot-Dipped

Ala. City, Ala. R2 .....5.85‡
Ashland, Ky. A10 .....5.85†
Canton, O. R2 .....5.85‡
Dover, O. R1 .....5.85†
Dravosburg, Pa. U5 ...5.85†
Fairfield, Ala. T2 .....5.85†
Gary, Ind. U5 .....5.85*
GraniteCity, Ill. G4 ....6.05
Ind. Harbor, Ind. I-2 ...5.85†
Kokomo, Ind. C16 .....5.95‡
MartinsFerry, O. W10 ..5.85*
Middletown, O. A10 ....5.85†
Newport, Ky. N9 .....5.85‡
Pittsburg, Calif. C11 ...6.60*
SparrowsPt., Md. B2 ..5.85†
Warren, O. R2 .....5.85†
Weirton, W. Va. W6 ...5.85*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous.

SHEETS, Well Casing

Fontana, Calif. K1 ....6.575

SHEETS, Galvanized High-Strength Low-Alloy

Dravosburg, Pa. U5 ....8.60
SparrowsPoint (39) B2..8.60

SHEETS, Galvannealed Steel

Canton, O. R2 .....6.25
Dravosburg, Pa. U5 ....6.25
Kokomo, Ind. C16 .....6.60
Newport, Ky. N9 .....6.25

SHEETS, Galvanized Ingot Iron (Hot-dipped Continuous)

Ashland, Ky. A10 .....6.10
Middletown, O. A10 ....6.10

SHEETS, Electrogalvanized

Cleveland (28) R2 .....6.70
Niles, O. (28) R2 .....6.70
Weirton, W. Va. W6 ....6.55

SHEETS, Aluminum Coated

Butler, Pa. A10 (type 1) .8.50
Butler, Pa. A10 (type 2) .8.60

SHEETS, Enameling Iron

Ashland, Ky. A10 .....5.90
Cleveland R2 .....5.90
Dravosburg, Pa. U5 ....5.90
Gary, Ind. U5 .....5.90
GraniteCity, Ill. G4 ....6.10
Ind. Harbor, Ind. I-2 ...5.90
Middletown, O. A10 ....5.90
Niles, O. M21 .....5.90
Youngstown Y1 .....5.90

BLUED STOCK, 29 Gage

Follansbee, W. Va. F4 ...7.75
Ind. Harbor, Ind. I-2 ....7.75
Yorkville, O. W10 .....7.75

SHEETS, Long Terne Steel (Commercial Quality)

BeechBottom, W. Va. W10 6.25
Gary, Ind. U5 .....6.25
Mansfield, O. E6 .....6.25
Middletown, O. A10 ....6.25
Niles, O. M21 .....6.25
Weirton, W. Va. W6 ....6.25

SHEETS, Long Terne, Ingot Iron

Middletown, O. A10 ....6.65

BARS, Reinforcing (Fabricated; to Consumers)

Johnstown, Pa. ¼-1" B2.6.15
KansasCity, Kans. S5 ...6.45
Lackawanna, N.Y. B2 ...6.17
Marion, O. P11 .....6.15
Pittsburgh U8 .....6.17
Seattle B3, N14 .....6.60
SparrowsPt. ½-1" B2...6.15
Williamsport, Pa. S19 ...6.00

RAIL STEEL BARS

ChicagoHts. (3) C2, I-2..4.65
ChicagoHts. (4) C2, I-2..4.65
Ft. Worth, Tex (26) T4...5.10
Franklin, Pa. (3) F5 ....4.65
Franklin, Pa. (4) F5 ....4.65
JerseyShore, Pa. (4) J8 ...4.65
Marion, O. (3) P11 .....4.65
Moline, Ill. (3) R2 .....4.80
Tonawanda (3) B12 ....4.65
Tonawanda (4) B12 ....5.15
Williamsport, Pa. (3) S19.4.65

BARS, Wrought Iron

Economy, Pa. (S.R.) B14 11.50
Economy, Pa. (D.R.) B14 14.30
Economy (Staybolt) B14. 14.65
McK. Rks. (S.R.) L5 ..11.50
McK. Rks. (D.R.) L5 ..16.00
McK. Rks. (Staybolt) L5.17.00

Key To Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.

B1 Babcock & Wilcox Co.
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div. Colo. Fuel & Iron
B11 Buffalo Bolt Co., Div., Buffalo-Eclipse Corp.
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div. Borg-Warner Corp.
C4 Carpenter Steel Co.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div. H. K. Porter Co. Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Products Dept. Wickwire Spencer Steel Division
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel Div., Sharon Steel Corp.
D4 Disston & Sons, Henry
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Inc.
F3 Fitzsimmons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div. Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel&Wire
F8 Ft. Wayne Metals Inc.

G2 Globe Iron Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins, E., Steel Tube
I-7 Indiana Steel&Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel&Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Suppy
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
K7 Kenmore Metals Corp.

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M13 Monarch Steel Div., Jones & Laughlin Steel Corp.
M14 McInnes Steel Co.
M16 Md. Fine&Special. Wire
M17 Metal Forming Corp.
M18 Milton Steel Prod. Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Titanium Corp.

N1 National-Standard Co.
N2 National Supply Co.
N3 National Tube Div., U.S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New Eng. High Carb. Wire
N8 Newman-Crosby Steel
N9 Newport Steel Corp.
N14 Northwest. Steel Roll. Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.
N19 Northeastern Steel Corp.
O3 Oliver Iron & Steel Corp.
O4 Oregon Steel Mills

P1 PacificStatesSteelCorp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co. Sub. of Barium Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts. Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RellianceDiv., EatonMfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Steel Div., Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Corp.
S40 Seneca Steel Service

T2 Tenn. Coal & Iron Div., U. S. Steel Corp.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Strip Division, Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.
T13 Tube Methods Inc.

U4 Universal-Cyclops Steel
U5 United States Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div. U. S. Steel Corp.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Division, H. K. Porter, Inc.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Co.
W7 W. Va. Steel&Mfg. Co.
W8 Western Automatic Machine Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
W19 Worcester Pressed Steel

Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	4.325
Allenport,Pa. P7	4.325
Alton,Ill. L1	4.50
Ashland,Ky.(8) A10	4.325
Atlanta A11	4.525
Bessemer,Ala. T2	4.325
Birmingham C15	4.825
Bridgeport,Conn. N19	4.625
Buffalo(27) R2	4.325
Conshohocken,Pa. A3	4.375
Detroit M1	4.425
Ecorse,Mich. G5	4.425
Fairfield,Ala. T2	4.325
Fontana,Calif. K1	5.075
Gary,Ind. U5	4.325
Ind.Harbor,Ind. I-2,Y1	4.325
Johnstown,Pa.(25) B2	4.325
Lackaw'na,N.Y.(24) B2	4.325
LosAngeles(25) B3	5.075
Milton,Pa. M18	4.325
Minnequa,Colo. C10	5.425
Pittsburg,Calif. C11	5.075
Portsmouth,O. P12	4.325
Riverdale,Ill. A1	4.55
SanFrancisco S7	5.05
Seattle(25) B3	5.325
Seattle N14	5 40
Sharon,Pa. S3	4 325
S.Chicago Ill. W'14	4.325
S.SanFrancisco(25) B3	5.075
SparrowsPoint,Md. B2	4.325
Sterling(1) N15	4.325
Sterling,Ill. N15	4.425
Torrance Calif. C11	5.075
Warren,O. R2	4.325
Weirton,W.Va. W6	4.325
Youngstown U5	4.325

STRIP, Hot-Rolled Alloy

Bridgeport,Conn. N19	7.50
Carnegie,Pa. S18	7.20
Fontana,Calif. K1	8.85
Gary,Ind. U5	7.20
Ind.Harbor,Ind. Y1	7.20
LosAngeles B3	8.40
Newport,Ky. N9	7.20
Sharon,Pa. S3	7.20
S.Chicago W14	7.20
Youngstown U5, Y1	7.20

STRIP, Hot-Rolled High-Strength Low-Alloy

Bessemer,Ala. T2	6.425
Conshohocken,Pa. A3	6.425
Ecorse,Mich. G5	6.525
Fairfield,Ala. T2	6.425
Fontana,Calif. K1	7.525
Gary,Ind. U5	6.425
Houston S5	6.675
Ind.Harbor,Ind. I-2, Y1	6.425
KansasCity,Mo. S5	6.675
Lackawanna,N.Y. B2	6.425
LosAngeles(25) B3	7.175
Seattle(25) B3	7.425
Sharon,Pa. S3	6.425
S.SanFrancisco(25) B3	7.175
SparrowsPoint,Md. B2	6.425
Warren,O. R2	6.425
Weirton,W.Va. W6	6.425
Youngstown U5, Y1	6.425

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10	4.575

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6	6.25
Baltimore T6	6.25
Boston T6	6.80
Buffalo S40	6.25
Cleveland A7, J5	6.25
Conshohocken,Pa. A3	6.30
Dearborn Mich. D3	6.35
Detroit D2, M1, P20	6.35
Dover,O. G6	6.25
Ecorse,Mich. G5	6.35
Follansbee,W.Va. F4	6.25
Fontana,Calif. K1	8.00
FranklinPark,Ill. T6	6.35
Ind.Harbor,Ind. I-2	6.35
Ind.Harbor,Ind. Y1	6.25
Indianapolis C8	6.40
Lackawanna,N.Y. B2	6.25
LosAngeles C1	8.30
NewBedford,Mass. R10	6.70
NewBritain(10) S15	6.25
NewCastle,Pa. B4, E5	6.25
NewHaven,Conn. A7, D2	6.70
NewKensington,Pa. A6	6.25
Pawtucket, R.I. R3	6.90
Pawtucket,R.I. N8	6.80
Pittsburgh J5	6.25
Riverdale,Ill. A1	6.35
Rome,N.Y.(32) R6	6.25
Sharon,Pa. S3	6.25
SparrowsPt.,Md. B2	6.25
Trenton,N.J.(31) R5	7.80
Wallingford,Conn. W2	6.70
Warren,O. R2, T5	6.25
Weirton,W.Va. W6	6.25
Worcester,Mass. A7	6.80
Youngstown C8, Y1	6.25

STRIP, Cold-Rolled Alloy

Boston T6	13.80
Carnegie,Pa. S18	13.45
Cleveland A7	13.45
Dover,O. G6	13.45
FranklinPark,Ill. T6	13.45
Harrison,N.J. C18	13.45
Indianapolis C8	13.60
Pawtucket,R.I. N8	13.80
Sharon,Pa. S3	13.45
Worcester,Mass. A7	13.75
Youngstown C8	13.45

STRIP, Cold-Rolled High-Strength Low-Alloy

Cleveland A7	9.10
Dearborn,Mich. D3	9.20
Dover,O. G6	9.30
Ecorse,Mich. G5	9.20
Ind.Harbor,Ind. Y1	9.30

STRIP, Cold-Finished Spring Steel (Annealed)

	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Baltimore T6	7.40	9.35	10.90	13.05	15.75
Boston T6	7.65	9.35	10.90	13.05	15.75
Bristol,Conn. W1	...	...	10.90	13.05	15.75
Carnegie,Pa. S18	...	9.05	10.60	12.75	....
Cleveland A7	7.10	9.05	10.60	12.75	15.45
Cleveland C7	...	9.05	10.60	12.75	15.45
Dearborn,Mich. D3	7.20	9.15	10.70	....	....
Detroit D2	7.20	9.15	10.70	12.85	....
Dover,O. G6	7.10	9.05	10.60	12.75	15.45
FranklinPark,Ill. T6	7.20	9.05	10.60	12.75	15.45
Harrison,N.J. C18	...	...	10.90	13.05	15.75
Indianapolis C8	7.25	9.20	10.60	12.75	15.45
NewBritain,Conn.(10) S15	7.10	9.05	10.60	12.75	15.45
NewCastle,Pa. B4, E5	7.10	9.05	10.60	12.75	....
NewHaven,Conn. D2	7.55	9.35	10.90	13.05	....
NewKensington,Pa. A6	7.10	9.05	10.60	....	....
NewYork W3	...	9.35	10.90	13.05	15.75
Pawtucket,R.I. N8	7.65	9.35	10.90	13.05	15.75
Riverdale,Ill. A1	7.20	9.05	10.60	12.75	15.45
Rome,N.Y.(32) R6	7.10	9.05	10.60	12.75	15.45
Sharon,Pa. S3	7.10	9.05	10.60	12.75	15.45
Trenton,N.J. R5	...	9.35	10.90	13.05	15.75
Wallingford,Conn. W2	7.55	9.35	10.90	13.05	15.75
Warren,O. T5	7.10	9.05	10.60	12.75	15.45
Weirton,W.Va. W6	7.10	9.05	10.60	12.75	15.45
Worcester,Mass. A7, T6	7.65	9.35	10.90	13.05	15.75
Youngstown C8	7.10	9.05	10.60	12.75	15.45
Spring Steel (Tempered)					
Bristol,Conn. W1	...	...	14.80	18.15	....
Buffalo W12	...	...	14.80	....	....
FranklinPark,Ill. T6	...	...	15.30	18.65	22.50
Harrison,N.J. C18	...	...	14.80	18.15	22.00
NewYork W3	...	...	14.80	18.15	22.00
Trenton,N.J. R5	...	...	14.80	18.15	22.00
Worcester,Mass. W12	...	...	14.80	....	....
Worcester,Mass. A7, T6	...	...	14.80	18.15	22.00
Youngstown C8	...	...	15.00	18.35	22.35

STRIP, Electrogalvanized

Cleveland A7	6.25*
Dover,O. G6	6.25*
Riverdale,Ill. A1	6.35*
Youngstown C8	6.25*
Warren,O. T5	6.25*
Warren,O. B9	6.45*
Weirton,W.Va. W6	5.75*
Worcester,Mass. A7	6.80*

*Plus galvanizing extras.

STRIP, Galvanized (Continuous)

Sharon,Pa. S3	6.55

TIGHT COOPERAGE HOOP

Atlanta A11	5.05
Riverdale,Ill. A1	4.90
Sharon,Pa. S3	4.75
Youngstown U5	4.75

SILICON STEEL

H.R. SHEETS(22 Ga., cut lengths)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	...	...	9.95	10.95	11.85
Brackenridge,Pa. A4	...	...	9.95	10.95	11.85
Mansfield O. E6	8.40	9.35	9.95	10.95	11.85
Newport,Ky. N9	8.40	9.35	9.95	10.95	11.85
Niles,O. M21	8.40	9.35	9.95	10.95	....
Vandergrift,Pa. U5	...	9.35	9.95	10.95	11.85
Warren,O. R2	8.40	9.35	9.95	10.95	11.85
Zanesville,O. A10	...	9.35	9.95	10.95	11.85

C.R. COILS & CUT LENGTHS, (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
Brackenridge,Pa. A4	...	...	10.70	11.70	12.60
GraniteCity,Ill. G4	8.80*	9.80*	10.40*	11.40*	....
IndianaHarbor,Ind. I-2	8.60†	9.60*	10.20*	11.20*	....
Vandergrift,Pa. U5	8.60*	9.60*	10.20*	11.20*	12.10*
Vandergrift,Pa. U5	...	10.10†	10.70†	11.70†	12.60†
Warren,O. R2	8.60†	10.10	10.70	11.70	12.60

H.R. SHEETS (22 Ga., cut lengths)	Transformer Grade T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	12.80	13.35	13.85	14.85
Brackenridge,Pa. A4	12.80	....	....	....
Newport,Ky. N9	12.80	....	....	....
Vandergrift,Pa. U5	12.80	13.35	13.85	14.85
Zanesville,O. A10	12.80‡	13.35‡	13.85‡	14.85‡

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	....	15.85	17.45	17.95	18.45	13.55**
Butler,Pa. A10	....	....	17.45	17.95	....	....
Vandergrift,Pa. U5	14.85	15.85	17.45	17.95	....	13.55
Warren,O. R2	....	....	....	....	....	13.55‡

*Semiprocessed. †Fully processed only. ‡Coils, annealed, semiprocessed ½c lower. §Coils, ¾-cent higher. **Cut lengths, ¾-cent lower.

TIN MILL PRODUCTS

TIN PLATE Electrolytic (Base Box)	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.90	$8.15	$8.55
Dravosburg,Pa. U5	7.90	8.15	8.55
Fairfield,Ala. T2	8.00	8.25	8.65
Fairless,Pa. U5	8.00	8.25	8.65
Gary,Ind. U5	7.90	8.15	8.55
GraniteCity,Ill. G4	8.00	8.25	8.65
IndianaHarbor,Ind. I-2, Y1	7.90	8.15	8.55
Niles,O. R2	7.90	8.15	8.55
Pittsburg,Calif. C11	8.65	8.90	9.30
SparrowsPoint,Md. B2	8.00	8.25	8.65
Weirton,W.Va. W6	7.90	8.15	8.55
Yorkville,O. W10	7.90	8.15	8.55

ELECTROTIN (22-27 Gage; Dollars per 100 lb)

Aliquippa,Pa. J5	6.675	....	....
Niles,O. R2	6.675	6.875	7.075

TINPLATE, American Coke (Base Box)	1.25 lb	1.50 lb
Aliquippa,Pa. J5	$9.20	$9.45
Dravosburg,Pa.U5	9.20	9.45
Fairfield,Ala. T2	9.30	9.55
Fairless,Pa. U5	9.30	9.55
Gary,Ind. U5	9.20	9.45
Ind.Har. I-2, Y1	9.20	9.45
Pitts.,Calif. C11	9.95	10.20
Sp.Pt.,Md. B2	9.30	9.55
Weirton,W.Va. W6	9.20	9.45
Yorkville,O. W10	9.20	9.45

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$7.00
Dravosburg,Pa. U5	7.00
Fairfield,Ala. T2	7.10
Fairless,Pa. U5	7.10
Gary,Ind. U5	7.00
GraniteCity,Ill. G4	7.10
Ind.Harbor,Ind. I-2, Y1	7.00
Niles,O. R2	7.00
Pittsburg,Calif. C11	7.75

SparrowsPoint,Md. B2	7.10
Warren,O. R2	7.00
Weirton,W.Va. W6	7.00
Yorkville,O. W10	7.00

HOLLOWARE ENAMELING Black Plate (29 Gage)

Dravosburg,Pa. U5	6.65
Gary,Ind. U5	6.65
GraniteCity,Ill. G4	6.75
Ind.Harbor,Ind. Y1	6.65
Yorkville,O. W10	6.65

MANUFACTURING TERNES (Special Coated; Base Box)

Dravosburg,Pa. U5	$8.70
Gary,Ind. U5	8.70
Yorkville,O. W10	8.70

MANUFACTURING TERNES (Light Coated, 6 lb; Base Box)

Yorkville,O. W10	$9.15

ROOFING SHORT TERNES (8 lb Coated; Base Box)

Gary,Ind. U5	$10.25

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2	6.60
Aliquippa,Pa. J5	6.60
Alton,Ill. L1	6.775
Atlanta A11	6.80
Bartonville,Ill. K4	6.35
Buffalo W12	6.60
Chicago W13	6.60
Cleveland A7	6.60
Crawfordsville,Ind. M8	6.70
Donora,Pa. A7	6.60
Duluth,Minn. A7	6.60
Fairfield,Ala. T2	6.60
Fostoria,O.(24) S1	6.80
Houston S5	6.85
Jacksonville,Fla. M8	6.95
Johnstown,Pa. B2	6.60
Joliet Ill. A7	6.60
KansasCity,Mo. S5	6.85
Kokomo,Ind. C16	6.70
LosAngeles B3	7.55
Minnequa,Colo. C10	6.85
Monessen,Pa. P7	6.60
Newark 6-8 ga. I-1	6 90
N.Tonawanda B11	6.60
Palmer,Mass. W12	6.90
Pittsburg,Calif. C11	7.20
Portsmouth,O. P12	6.60
Rankin,Pa. A7	6.60
S.Chicago,Ill. R2	6.60
S.SanFrancisco C10	7.55
SparrowsPoint,Md. B2	6.70
Sterling,Ill.(1) N15	6.60
Sterling,Ill. N15	6.70
Struthers,O. Y1	6.60
Waukegan,Ill. A7	6.60
Worcester,Mass. A7	6.90

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5	7.90
Alton,Ill. L1	8.075
Bartonville,Ill. K4	8.00
Buffalo W12	7.90
Cleveland A7	7.90
Donora,Pa. A7	7.90
Duluth,Minn. A7	7.90
Fostoria,O. S1	7.95
Johnstown,Pa. B2	7.90
LosAngeles B3	8.85
Milbury,Mass.(12) N6	8.20
Minnequa,Colo. C10	8.15
Monessen,Pa. P16	7.90
Muncie,Ind. I-7	8.10
Palmer,Mass. W12	8.20
Pittsburg,Calif. C11	8.85
Portsmouth,O. P12	7.90
Roebling,N.J. R5	8.20
S.Chicago,Ill. R2	7.90
S.SanFrancisco C10	8.85
SparrowsPt.,Md. B2	8.00
Struthers,O. Y1	7.90
Trenton,N.J. A7	8.20
Waukegan,Ill. A7	7.90
Worcester A7,J4,T6,W12	8.20

WIRE, Upholstery Spring

Aliquippa,Pa. J5	7.60
Alton,Ill. L1	7.775
Buffalo W12	7.60
Cleveland A7	7.60
Donora,Pa. A7	7.60
Duluth,Minn. A7	7.60
Johnstown,Pa. B2	7.60
KansasCity,Mo. S5	7.85
LosAngeles B3	8.55
Minnequa,Colo. C10	7.775
Monessen,Pa. P16	7.60
NewHaven,Conn. A7	7.90
Palmer,Mass. W12	7.90
Pittsburg,Calif. C11	8.55
Portsmouth,O. P12	7.60
Roebling,N.J. R5	7.90
S.Chicago,Ill. R2	7.60
S.SanFrancisco C10	8.55
SparrowsPoint,Md. B2	7.70
Struthers,O. Y1	7.60
Trenton,N.J. A7	7.90
Waukegan,Ill. A7	7.60
Worcester,Mass. A7	7.90

WIRE, Fine & Weaving (8"Coils)

Alton,Ill. L1	12.725
Bartonville,Ill. K4	12.65
Buffalo W12	12.55
Chicago W13	12.55
Cleveland A7	12.55
Crawfordsville,Ind. M8	12.65
Fostoria,O. S1	12.55
Jacksonville,Fla. M8	12.90
Johnstown,Pa. B2	12.55
Kokomo,Ind. C16	12.55
Minnequa,Colo. C10	12.30
Monessen,Pa. P6	12.55
Muncie,Ind. I-7	12.75
Palmer,Mass. W12	12.85
Roebling,N.J. R5	12.85
S.SanFrancisco C10	12.90
Waukegan,Ill. A7	12.55
Worcester,Mass. A7,T6	12.85

WIRE, Gal'd ACSR for Cores

Bartonville,Ill. K4	10.70
Buffalo W12	10.70
Johnstown,Pa. B2	10.70
Minnequa,Colo. C10	10.825
Monessen,Pa. P16	10.70
Muncie,Ind. I-7	10.90
Pittsburg,Calif. C11	11.50
Portsmouth,O. P12	10.70
Roebling,N.J. R5	11.00
SparrowsPt.,Md. B2	10.80
Struthers,O. Y1	10.70

ROPE WIRE (A)

Bartonville,Ill. K4	10.55
Buffalo W12	10.55
Fostoria,O. S1	10.55
Johnstown,Pa. B2	10.55
Monessen,Pa. P16	10.55
Muncie,Ind. I-7	10.75
Palmer,Mass. W12	10.85
Portsmouth,O. P12	10.55
Roebling,N.J. R5	10.85
SparrowsPt. B2	10.65
Struthers,O. Y1	10.55
Worcester,Mass. J4	10.85

(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE
(Continued)

WIRE, Tire Bead

Bartonville,Ill. K4	14.15
Monessen,Pa. P16	14.20
Roebling,N.J. R5	14.35

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	9.00
Baltimore T6	9.80
Buffalo W12	9.00
Cleveland A7	9.50
Crawfordsville,Ind. M8	9.00
Dover,O. G6	9.00
Fostoria,O. S1	9.00
FranklinPark,Ill. T6	9.60
Kokomo,Ind. C16	9.00
Massillon,O. R8	9.00
Milwaukee C23	9.20
Monessen,Pa. P16	9.00
Pawtucket,R.I. N8	9.80
Riverdale,Ill. A1	9.10
Rome,N.Y. R6	9.00
Trenton,N.J. R5	9.80
Worcester A7, T6, W12	9.80

NAIL, Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala.(44) R2	*152*
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Chicago,Ill. W13	152
Cleveland A9	157
Crawfordsville,Ind. M8	154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Galveston,Tex. D7	157
Houston,Tex. S5	157
Jack'ville,Fla.(23) M8	162
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
KansasCity,Mo. S5	157
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
S.Chicago,Ill.(44) R2	*152*
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

NAILS, CUT (100 lb keg)

To Dealers (33)	
Conshohocken,Pa. A3	$9.05
Wheeling,W.Va. W10	9.05

STAPLES, Polished Stock

To Dealers & Mfrs. (7)	Col.
AlabamaCity,Ala.(44) R2	*152*
Aliquippa,Pa. J5	152
Atlanta A11	154
Bartonville,Ill. K4	154
Crawfordsville,Ind. M8	154
Donora,Pa. A7	152
Duluth,Minn. A7	152
Fairfield,Ala. T2	152
Jack'ville,Fla.(23) M8	162
Johnstown,Pa. B2	152
Joliet,Ill. A7	152
Kokomo,Ind. C16	154
Minnequa,Colo. C10	157
Monessen,Pa. P7	152
Pittsburg,Calif. C11	171
Rankin,Pa. A7	152
S.Chicago,Ill.(44) R2	*152*
SparrowsPt.,Md. B2	154
Sterling,Ill.(1) N15	152
Worcester,Mass. A7	158

TIE WIRE, Automatic Baler (14½ Ga.) (Per 97 lb Net Box)

Coil No. 3150	
AlabamaCity,Ala. R2	*$9.45*
Bartonville,Ill. K4	9.45
Buffalo W12	9.35
Crawfordsville,Ind. M8	9.45
Donora,Pa. A7	9.35
Duluth,Minn. A7	9.35
Jacksonville,Fla. M8	9.88
Johnstown,Pa. B2	9.35
Joliet,Ill. A7	9.35
Kokomo,Ind. C16	9.45
LosAngeles B3	10.14
Minnequa,Colo. C10	9.60
Pittsburg,Calif. C11	10.13
S.Chicago,Ill. R2	*9.45*
SparrowsPt.,Md. B2	9.45
Sterling,Ill. N15	9.35
Coil No. 6500 Stand.	
AlabamaCity,Ala. R2	*$9.75*
Bartonville,Ill. K4	9.75
Buffalo W12	9.65
Crawfordsville,Ind. M8	9.75
Donora,Pa. A7	9.65
Duluth,Minn. A7	9.65
Jacksonville,Fla. M8	10.18
Johnstown,Pa. B3	9.65
Joliet,Ill. A7	9.65
Kokomo,Ind. C16	9.75
LosAngeles B3	10.45
Minnequa,Colo. C10	9.90
Pittsburg,Calif. C11	10.45
S.Chicago,Ill. R2	*9.75*
SparrowsPt.,Md. B2	9.75
Sterling,Ill. N15	9.65
Coil No. 6500 Interim	
AlabamaCity,Ala. R2	*$9.80*
Bartonville,Ill. K4	9.80
Buffalo W12	9.70
Crawfordsville,Ind. M8	9.80
Donora,Pa. A7	9.70
Duluth,Minn. A7	9.70
Jacksonville,Fla. M8	10.23
Johnstown,Pa. B2	9.70
Joliet,Ill. A7	9.70
Kokomo,Ind. C16	9.80
LosAngeles B3	10.50
Minnequa,Colo. C10	9.95
Pittsburg,Calif. C11	10.50
S.Chicago,Ill. R2	*9.80*
SparrowsPt.,Md. B2	9.80
Sterling,Ill. N15	9.70

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	.175**
Aliquippa,Pa. J5	172‡
Atlanta A11	181
Bartonville,Ill. K4	181
Crawfordsville,Ind. M8	181
Donora,Pa. A7	175†
Duluth Minn. A7	175†
Fairfield,Ala. T2	175†
Houston,Tex. S5	180**
Jacksonville,Fla. M8	186
Johnstown,Pa. B2	179*
Joliet,Ill. A7	175†
KansasCity,Mo. S5	180**
Kokomo,Ind. C16	177†
Minnequa,Colo. C10	180**
Monessen,Pa. P7	178††
Pittsburg,Calif. C11	195†
Rankin,Pa. A7	175†
S.Chicago,Ill. R2	175**
S.SanFrancisco C10	195**
SparrowsPoint,Md. B2	181*
Sterling,Ill.(1) N15	179††

WOVEN FENCE, 9-15 ga.

	Col.
Ala.City,Ala. R2	162**
Ala.City, 17 ga. R2	257**
Ala.City, 18 ga. R2	267**
Aliq'ppa,Pa.9-14½ga J5	165‡
Atlanta A11	168
Bartonville,Ill. K4	168
Crawfordsville Ind. M8	168
Donora,Pa. A7	162†
Duluth,Minn. A7	162†
Fairfield,Ala. T2	162†
Houston,Tex. S5	167**
Jacksonville,Fla. M8	173
Johnstown,Pa.(43) B2	166
Joliet,Ill. A7	162†
KansasCity,Mo. S5	167**
Kokomo,Ind. C16	164†
Minnequa,Colo. C10	167**
Monessen,Pa. 9 ga. P17	166††
Pittsburg,Calif. C11	185†
Rankin,Pa. A7	162†
S.Chicago,Ill. R2	162**
Sterling,Ill.(1) N15	166††

WIRE (16 Gage)

	An'ld Galv.	Stone Stan.
Ala.City R2	14.50	16.05**
Bartonville K4	14.50	16.55
Buffalo W12	14.50	
Cleveland A7	14.50	
Crawf'dsville M8	14.60	16.55
Fostoria,O. S1	14.60	16.15†
Jacksonville M8	14.85	16.80
Johnstown B2	14.50	16.40*
Kokomo C16	14.60	16.15†
Minnequa C10	14.75	16.45**
Palmer,MassW12	14.50	16.05*
Pitts.,Calif. C11	14.85	16 40†
S.Chicago R2	14.50	16.05**
SparrowsPt. B2	14.60	16.50*
Sterling(1) N15	14.50	16.45††
Waukegan A7	14.50	16.05†
Worcester A7	14.80	

WIRE, Merchant Quality

(6 to 8 gage)	An'ld Galv.
Ala.City,Ala. R2	*7.50 7.90***
Aliquippa J5	7.40 7.925‡
Atlanta A11	7.50 8.10
Bartonville(48) K4	7.50 8.10
Buffalo W12	7.40 8.80†
Cleveland A7	7.40
Crawfordsville M8	7 50 8.10
Donora,Pa. A7	7.40 7.80†
Duluth,Minn. A7	7.40 7.80†
Fairfield T2	7.40 7.80†
Houston(48) S5	7.65 8.05**
Jacks'ville,Fla.M8	7.75 8.35
Johnstown B2(48)	7.40 7.975*
Joliet,Ill. A7	7.40 7.80†
Kans.City(48) S5	7.65 8.05**
Kokomo C16	7.50 7.90†
LosAngeles B3	8.35 8.925*
Minnequa C10	7.65 8.05**
Monessen P7(48)	7.40 8.00††
Palmer,Mass. W12	7.70 8.10†
Pitts.,Calif. C11	8.35 8.75†
Portsmouth,O. P12	7.40
Rankin A7	7.40 7.80†
S.Chicago R2	*7.50 7.90***
S.SanFran. C10	8.35 8.75**
Spar'wsPt.B2(48)	7.50 8.075*
Str'ing(1)(48)N15	7.40 8.00††
Struthers,O.(48)Y1	7.40 7.90‡
Worcester,Mass.A7	7.70

*Based on 12.50c zinc; †5c zinc; ‡10c zinc; ‡Less than 10c zinc; **Subject to zinc equalization extras. ††13c zinc.

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	*175*
Atlanta A11	175
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth,Minn. A7	173
Fairfield,Ala. T2	173
Jacksonville,Fla. M8	180
Joliet,Ill. A7	173
Houston S5	178
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
S.Chicago R2	*175*
S.SanFran.,Calif. C10	197
SparrowsPoint,Md. B2	175
Sterling,Ill.(1) N15	173

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2, I-2	157
Duluth,Minn. A7	157
Franklin,Pa. F5	157
Huntington,W.Va. W7	157
Johnstown,Pa. B2	157
Marion,O. P11	157
Minnequa,Colo. C10	162
Moline,Ill. R2	162
S.Chicago,Ill. R2	157
Tonawanda,N.Y. B12	157
Williamsport,Pa. S10	160

FASTENERS

(Base discounts, full case quantity, per cent off list to consumer, f.o.b. mill)

Carriage, Machine Bolts

Full-Size Body (cut thread)

†½" x 6" and smaller	61
Larger than ½" diam. and all diams. longer than 6"	55
Under-Size Body (rolled thread; not nutted): ½" x 6" and smaller.	61

†½" x 4" and smaller and shorter are not nutted.

Carriage, Machine & Lag Bolts, Hot Galvanized:

½" and smaller	42
Larger than ½" diam. and all diams. longer than 6"	32

Lag Bolts

All diams. & 6" and shorter	61
All diams. longer than 6"	55

Plow, Tap & Blank Bolts

½" x 6" and smaller.	61
Larger than ½" diam. and all diams. longer than 6"	55

Ribbed Neck, Carriage, Step, Elevator, Fitting-up and Tire Bolts:

All sizes	61

STOVE BOLTS, SLOTTED (nuts not attached; bulk)

⅛" to ¼" diam. incl., 3" or shorter:	
25,000 to 199,999 pieces	61
200,000 or more pieces	64
⅛" to ½" diam. incl., 3" or shorter:	
15,000 to 99,999 pieces	61
100,000 or more pieces	64
Longer than 3", any diam.:	
5000 to 99,999 pieces	61
100,000 or more pieces	64

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburgh, f.o.b. Chicago, and/or freight equalized with Birmingham except where equalization is too great.

Structural ½-in., larger 9.95
⅞-in. under..List less 32%

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	21.06	20.42
1¼	13	....	24.94	20.45
1½	13	23.31	27.57	22.61
1⅝	13	27.54	32.57	26.71
2	13	30.87	36.51	29.93
2¼	13	34.77	41.12	33.72
2½	12	37.73	44.63	36.60
2¾	12	41.57	49.16	40.31
2⅞	12	45.00	53.22	43.65
3	12	47.99	56.76	46.55

RAILWAY MATERIALS

	Standard No. 1	Standard No. 2	Tee Rails All No. 2	Tee Rails 60 lb Under
RAILS				
Bessemer,Pa. U5	4.725	4.625	4.675	5.65
Ensley,Ala. T2	4.725	4.625	....	5.65
Fairfield,Ala. T2	....	....	....	5.65
Gary,Ind. U5	4.725	4.625	4.675	....
Huntington,W.Va. W7	....	....	....	5.65
IndianaHarbor,Ind. I-2	4.725	4.625	4.675	....
Johnstown,Pa. B2	....	....	...(16)	5.65
Lackawanna,N.Y. B2	4.725	4.625	...(16)	5.65
Minnequa,Colo. C10	4.725	4.625	....	6.15
Steelton Pa. B2	4.725	4.625	....	....
Williamsport,Pa. S19	....	....	....	5.65
TIE PLATES				
Fairfield,Ala. T2	5.625			
Gary,Ind. U5	5.625			
Ind.Harbor,Ind. I-2	5.625			
Lackawanna,N.Y. B2	5.625			
Minnequa,Colo. C10	5.625			
Seattle B3	5.775			
Steelton,Pa. B2	5.625			
Torrance,Calif. C11	5.775			
TRACK BOLTS (20) Treated				
Cleveland R2	12.90			
KansasCity,Mo. S5	12.90			
Lebanon,Pa. B2	12.15*			
Minnequa,Colo. C10	12.15*			
Pittsburgh O3, P14	12.15*			
Seattle B3	12.65*			
JOINT BARS				
Bessemer,Pa. U5	5.825			
Fairfield,Ala. T2	5.825			
Ind.Harbor,Ind. I-2	5.825			
Joliet Ill. U5	5.825			
Lackawanna,N.Y. B2	5.825			
Minnequa,Colo. C10	5.825			
Steelton,Pa. B2	5.825			
SCREW SPIKES				
Cleveland R2	11.90			
Pittsburgh O3	11.90			
STANDARD TRACK SPIKES				
Fairfield,Ala. T2	7.90			
Ind.Harbor,Ind. I-2, Y1	7.90			
KansasCity,Mo. S5	7.90			
Lebanon,Pa. B2	7.90			
Minnequa,Colo. C10	7.90			
Pittsburgh J5	7.90			
Seattle B3	8.40			
S.Chicago,Ill. R2	7.90			
Struthers,O. Y1	7.90			
Youngstown R2	7.90			

*Untreated

AXLES

Ind.Harbor,Ind. S13	*7.50*
Johnstown,Pa. B2	7.50

METAL POWDER

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted)

Sponge iron:	Cents
98+% Fe, annealed.	9.25
Swedish, c.l.f., Camden, N. J., c.l. in bags..	9.50
Domestic, f.o.b., Johnstown, Pa., Riverton, N.J., Niagara Falls, N.Y., in bags	9.50
Canadian, f.o.b. shipping point	9.50
Electrolytic iron:	
Melting stock, 99.9% Fe, irregular fragments of ⅛ in. x 1.3 in.	22.00
Annealed, 99.5% Fe.	36.50
Unannealed (99+% Fe)	34.00
Unannealed (99+% Fe) (minus 325 mesh)	57.00
Powder Flakes (minus 16, plus 100 mesh)..	31.00
Carbonyl Iron:	
98.1-99.9%, 3 to 20 microns, depending on grade, 86.00-275.00, in standard 200-lb. containers; all minus 200 mesh.	
Aluminum:	
Atomized, 500 lb, drum frght. allowed	
Carlots	34.50
Ton lots	36.50
Antimony, 500 lb lots	32.00*
Brass, 5000-lb lots	39.75-55.00†
Bronze, 5000-lb lots	66.50-70.75†
Copper:	
Electrolytic	14.25*
Reduced	14.25*
Lead	7.50*
Manganese:	
Minus 35 mesh	64.00
Minus 100 mesh	70.00
Minus 200 mesh	75.00
Nickel, unannealed	$1.00
Nickel-Silver, 5000-lb lots	61.75-64.25†
Phosphor-Copper, 5000-lb lots	68.75
Silicon	47.50
Solder	7.00*
Stainless Steel, 302	99.00
Stainless Steel, 316	$1.32
Tin	14.50*
Zinc 5000-lb lots	19.25-33.00‡
Tungsten	Dollars
Melting grade, 99%	
60 to 200 mesh:	
1000 lb and over	4.50
Less than 1000 lb	4.65
Chromium, electrolytic 99.8% Cr min. metallic basis	5.00

*Plus cost of metal. †Depending on composition. ‡Depending on mesh. §70% Cu, 20% Zn, 10% Ni. **64% Cu, 18% Zn, 18% Ni.

Footnotes

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant.
(4) Reinforcing.
(5) 1¼-in. to less than 1 7/16-in.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Pittsburgh base.
(11) Cleveland & Pitts. base.
(12) Worcester, Mass., base.
(13) Add 0.25c for 17 Ga. & heavier.
(14) Gage 0.143 to 0.249 in.; for gage 0.142 and lighter, 5.80c.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(18) To dealers.
(19) Chicago & Pitts. base.
(20) 0.25 off for untreated.
(21) New Haven, Conn., base.
(22) Deld. San Francisco Bay area.
(23) Plus 4c per 100 lb.
(24) Deduct 0.10c, finer than 15 Ga.
(25) Bar mill bands.
(26) Delivered in mill zone, 5.25c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Youngstown base.
(30) Sheared; for universal mill and 0.45c for carbon, add 0.40c for alloy and 0.45c H.S.-L.A.
(31) Widths over ⅝-in.; 6.90c for widths ⅝-in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) To jobbers, deduct 20c.
(34) 9.60c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 13 Ga. & heavier; 60" & narrower.
(38) 14 Ga. & lighter; 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035"; 0.035" and heavier, 0.25c higher.
(41) 9.10c for cut lengths.
(42) Mill lengths, f.o.b. mill; deld. in mill zone or within switching limits, 5.25c.
(43) 9-14½ Ga.
(44) Plus 3c per 100 lb.
(48) 6-7 Ga.
(49) 3½-in. and smaller rounds; 7.95c over 3½-in. and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Ambridge, Pa. N2	6.5	..	10.5	...	13	...	14.5	...	14.5	...	14	...	16.5	...
Lorain, O. N3	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25
Youngstown Y1	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

ELECTRIC WELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	6.5	+11.5	10.5	+8.25	13	+5.75	14.5	+4.25	14.5	+4.25	14	+4.75	16.5	+2.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Sizes—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Alton, Ill. L1	...	...	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Benwood, W. Va. W10	17.5	+13	9	+18.5	+0.75	+28.5	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Butler, Pa. F6	18	+12.5	9.5	+18	1.5	+26	...	...	...	...	...	...	...	...
Etna, Pa. N2	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Fairless, Pa. N3	...	...	....	....	....	....	16.5	+2.75	19.5	1.25	22	4.75	24.5	6.5
Fontana, Calif. K1	...	...	....	....	....	....	7	+12.25	10	+8.25	12.5	+4.75	15	+3
Ind. Harbor, Ind. Y1	...	...	....	....	....	....	17.5	+1.75	20.5	2.25	23	5.75	25.5	7.5
Lorain, O. N3	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sharon, Pa. S4	18	+12.5	9.5	+18	1.5	+26	...	...	...	...	...	...	...	...
Sharon, Pa. M6	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Sparrows Pt., Md. B2	16	+12.5	7.5	+18	+0.5	+25	16.5	+0.75	19.5	3.25	22	6.75	24.5	8
Youngstown R2, Y1	...	...	....	....	....	....	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5
Wheatland, Pa. W9	18	+12.5	9.5	+18	1.5	+26	18.5	+0.75	21.5	3.25	24	6.75	26.5	8.5

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.73		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Alton, Ill. L1	25	7.5	25.5	8	27	8.75	27	8.75	....	...	....	...
Benwood, W. Va. W10	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Etna, Pa. N2	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Fairless, Pa. N3	25	7.5	25.5	8	27	8.75	27	8.75	17.5	+1.25	17.5	+1.25
Fontana, Calif. K1	15.5	+2	16	+1.5	17.5	+0.75	17.5	+0.75	8	+10.75	8	+10.75
Ind. Harbor, Ind. Y1	26	8.5	26.5	9	28	9.75	28	9.75	18.5	+0.25	18.5	+0.25
Lorain, O. N3	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sharon, Pa. M6	27	9.5	27.5	10	29	10.75	29	10.75	....	...	....	...
Sparrows Pt., Md. B2	25	9	25.5	9.5	27	9.75	27	9.75	17.5	+0.25	17.5	+0.25
Youngstown R2, Y1	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75
Wheatland, Pa. W9	27	9.5	27.5	10	29	10.75	29	10.75	19.5	0.75	19.5	0.75

*Galvanized pipe discounts based on current price of zinc (13.50c, East St. Louis).

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	Rerolling: Ingot	Rerolling: Slabs	Forging Billets	Seamless Tube Billets	H.R. Strip	Wire Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	18.50	23.00	....	....	31.00	....	....	....	42.25	39.00
202	19.75	25.50	31.00	36.25	33.50	....	36.75	38.75	42.50	42.50
301	19.25	23.75	....	36.75	32.00	36.00	38.00	....	44.25	41.00
302	20.50	26.25	32.00	37.25	34.50	36.25	38.25	40.25	44.50	44.50
302B	20.25	26.50	33.00	37.25	37.75	36.25	38.25	40.25	47.00	47.00
303	....	26.75	34.75	40.00	....	39.00	41.00	....	....	....
304	21.75	27.50	33.75	39.00	37.25	38.25	40.25	43.00	47.25	47.25
304L	....	....	38.75	44.00	42.25	43.25	45.25	48.00	52.25	52.25
305	23.25	30.25	....	39.50	40.25	38.25	40.25	43.50	50.25	50.25
308	23.50	30.50	38.50	44.25	41.25	43.25	45.50	49.75	52.00	52.00
309	31.00	39.75	46.75	53.50	53.50	52.00	54.75	58.25	67.00	67.00
310	37.25	48.00	62.25	72.25	68.50	69.75	73.50	75.25	78.75	78.75
314	....	....	....	....	....	69.75	....	75.25	....	....
316	31.50	40.25	51.25	59.50	58.25	57.75	60.75	64.00	68.25	68.25
316L	....	....	56.25	64.50	63.25	62.75	65.75	69.00	73.25	73.25
317	37.25	48.25	62.75	72.75	73.50	70.75	74.50	77.00	83.75	83.75
321	25.00	32.00	38.25	44.00	44.25	43.00	45.25	49.25	54.25	54.25
18-8CbTa	29.25	38.00	45.75	52.25	53.25	50.75	53.50	58.00	66.50	66.50
403	....	....	28.75	32.75	....	32.25	34.00	36.25	....	....
405	17.50	23.00	26.75	31.00	32.25	30.50	32.00	33.75	42.25	42.25
410	15.00	19.50	25.50	29.50	28.00	29.00	30.50	31.75	36.25	36.25
416	....	....	26.00	30.00	....	29.50	31.00	....	....	....
420	....	30.25	31.00	36.00	37.75	35.50	37.25	40.75	56.00	56.00
430	15.25	19.75	26.00	30.00	28.75	29.50	31.00	32.25	36.75	36.75
430F	....	....	26.50	30.50	....	30.00	31.50	....	....	....
431	....	25.50	33.25	....	....	37.25	39.25	40.75	....	....
446	....	....	35.50	40.50	53.25	40.00	42.00	43.25	63.25	63.25

Stainless Steel Producers Are: Allegheny Ludlum Steel Corp.; Alloy Metal Wire Co. Inc.; Alloy Tube Div., Carpenter Steel Co.; American Steel & Wire Div., U. S. Steel Corp.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; G. O. Carlson Inc.; Carpenter Steel Co.; Charter Wire Products Co.; Cold Metal Products Co.; Crucible Steel Co. of America; Damascus Tube Co.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Ellwood Ivins Steel Tube Works Inc.; Firth Sterling Inc.; Ft. Wayne Metals Inc.; Globe Steel Tubes Co.; Helical Tube Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Joslyn Mfg. & Supply Co.; Kenmore Metals Corp.; Maryland Fine & Specialty Wire Co.; McLouth Steel Corp.; Metal Forming Corp.; McInnes Steel Co.; National-Standard Co.; National Tube Div., U. S. Steel Corp.; Newman-Crosby Steel Co.; Pacific Tube Co.; Page Steel & Tube Div., American Chain & Cable Co. Inc.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Rodney Metals Inc.; Rome Mfg. Co.; Rotary Electric Steel Co.; Sharon Steel Corp.; Sawhill Tubular Products Inc.; Simonds Saw & Steel Co., Specialty Wire Co. Inc.; Spencer Wire Corp.; Stainless Welded Products Inc.; Standard Tube Co.; Superior Steel Corp.; Superior Tube Co.; Timken Roller Bearing Co.; Trent Tube Co.; Tube Methods Inc.; Ulbrich Stainless Steels; United States Steel Corp.; Universal-Cyclops Steel Co.; Wallingford Steel Co.; Washington Steel Corp.

Clad Steel

	Plates: Carbon Base 10%	Plates: Carbon Base 20%	Sheets: Carbon Base 20%
302	....	....	30.50
304	30.30	36.05	32.50
304-L	32.30	37.95	....
310	41.30	47.00	....
316	35.50	41.40	47.00
316-L	40.00	46.10	....
316-CB	41.15	48.45	....
321	32.00	37.75	37.25
347	34.40	41.40	48.25
405	25.80	33.35	....
410	25.30	32.85	....
430	25.30	32.85	....
Inconel	49.45	65.45	....
Nickel	41.05	55.65	....
Nickel, Low Carbon	43.25	60.05	....
Monel	42.35	56.35	....
Copper*	....	....	46.00

	Strip, Carbon Base: Cold Rolled 10%	Strip, Carbon Base: Cold Rolled Both Sides
*Copper**	*32.75*	*41.25*

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. C22. Coatesville, Pa. L7, New Castle, Ind. I-4 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Regular Carbon	0.275	5% Cr Hot Work	0.430-0.460
Extra Carbon	0.330	W-Cr Hot Work	0.450
Special Carbon	0.390	V-Cr Hot Work	0.470
Oil Hardening	0.430	Hi-Carbon-Cr	0.770

Grade by Analysis (%)

W	Cr	V	Co	Mo	$ per lb
20.25	4.25	1.6	12.25	...	4.090
18.25	4.25	1	4.75	...	2.305-2.475
18	4	2	9	...	2.675-2.675
18	4	2	....	...	1.765
18	4	1	....	...	1.600
13.75	3.75	2	5	...	2.245
13.5	4	3	....	...	1.865
9	3.5	..	....	...	1.180
6	4	2	....	5	1.105
6	4	3	....	6	1.350
1.5	4	1	....	8.5	0.960

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, J3, M14, S8, U4, V2 and V3.

Pig Iron

F.o.b. furnace prices in dollars per gross ton, as reported to STEEL. Minimum delivered prices are approximate and do not include 3% federal tax.

Birmingham District	Basic	No. 2 Foundry	Malleable	Bessemer
AlabamaCity,Ala. R2	54.50	....	....	....
Birmingham R2	54.50	55.00‡	....	....
Birmingham U6	....	55.00‡	59.00	....
Woodward,Ala. W15	54.50	55.00‡	59.00	....
Cincinnati, deld.	....	62.70	....	....
Buffalo District				
Buffalo H1, R2	58.50	59.00	59.50	60.00
Tonawanda,N.Y. W12	58.50	59.00	59.50	60.00
N.Tonawanda, N.Y. T9	....	59.00	59.50	60.00
Boston, deld.	69.15	69.65	70 15	....
Rochester,N.Y. deld.	61.52	62.02	62.52	....
Syracuse,N.Y. deld.	62.62	63.12	63.62	....
Chicago District				
Chicago I-3	58.50	59.00	59.00	59.50
Gary,Ind. U5	58.50	....	59.00	....
S.Chicago R2	58.50	....	59.00	....
S.Chicago,Ill. Y1	58.50	59.00	59.00	59.50
S.Chicago,Ill. U5, W14	58.50	.	59 00	59.50
Milwaukee, deld.	60.80	61.30	61.30	61.80
Muskegon,Mich. deld.	....	65.68	65.68	....
Cleveland District				
Cleveland A7, R2	58.50	59.00	59.00	59.50
Akron,O., deld.	61.25	61.75	61.75	62.25
Lorain,O. N3	58.50	....	....	59.50
Mid-Atlantic District				
Bethlehem,Pa. B2	60.50	61.00	61.50	62.00
NewYork, deld.	....	64.78	65.28	....
Newark, deld.	63.52	64.02	64.52	65.02
Birdsboro,Pa. B10	60.50	61.00	61.50	62.00
Chester,Pa. P14	60.50	61.00	61.50	....
Philadelphia, deld.	62.16	62.66	63.16	....
Steelton,Pa. B2	60.50	61.00	61.50	62.00
Swedeland,Pa. A3	60.50	61.00	61.50	62.00
Philadelphia, deld.	62.16	62.66	63.16	63.66
Troy,N.Y. R2	60.50	61.00	61.50	62.00
Pittsburgh District				
NevilleIsland,Pa. P6	58.50	59.00	59.00	....
Pittsburgh (N&S sides), Aliquippa, deld.	....	60.37	60.37	60.87
McKeesRocks, deld.	....	60.04	60.04	60.54
Lawrenceville,Homestead, Wilmerding, Monaca, deld.	....	60.66	60.66	61.16
Verona,Trafford, deld.	60.69	61.19	61.19	61.69
Brackenridge, deld.	60.95	61.45	61.45	61.95
Bessemer,Pa. U5	58.50	....	59.00	59.50
Clairton,Rankin,S.Duquesne,Pa. U5.	58.50	....	....	....
McKeesport,Pa. N3	58.50	....	....	59.50
Midland,Pa. C18	58.50	....	....	....

Youngstown District	Basic	No. 2 Foundry	Malleable	Bessemer
Hubbard,O. Y1	....	....	59.00	....
Sharpsville,Pa. S6	58.50	....	59.00	59.50
Youngstown Y1	....	....	59.00	59.50
Youngstown U5	58.50	....	....	59.50
Mansfield,O., deld.	63.40	....	63.90	64.40
Duluth I-3	58.50	59.00	59.00	59.50
Erie,Pa. I-3	58.50	59.00	59.00	59.50
Everett,Mass. E1	62.00	62.50	63.00	....
Fontana,Calif. K1	64.50	65.00	....	....
Geneva,Utah C11	58.50	59.00	....	....
GraniteCity,Ill. G4	60.40	60.90	61.40	....
Ironton,Utah C11	58.50	59.00	....	....
LoneStar,Texas L6	....	55.00*	....	....
Minnequa,Colo. C10	60.50	61.00	61.50	....
Rockwood,Tenn. T3	....	55.00‡	59.00	....
Toledo,O. I-3	58.50	59.00	59.00	59.50
Cincinnati, deld.	64.26	64.76	....	....

*Phos. 0.51-0.75%; $56, Phos. 0.31-0.50%.
‡Intermediate (Phos. 0.31-0.69%), $56.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos iron on which base is 1.75-2.00%.
Manganese: Add 50 cents per ton for each 0.50% manganese over 1% or portion thereof.
Nickel: Under 0.05% no extra; 0.50-0.74%, inclusive, add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.25 for each 0.5% Si; 75 cents for each 0.50% Mn over 1%)

Jackson,O. G2, J1	$67.50
Buffalo H1	68.75

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Niagara Falls,N.Y. P15	$91.00
Keokuk,Iowa, (Open-hearth & Fdry, freight allowed K2)	95.50
Keokuk, O.H. & Fdry, 12½ lb piglets, 16% Si, frgt allowed K2	98.50

LOW PHOSPHORUS PIG IRON, Gross Ton

Lyles,Tenn. T3 (Phos. 0.035% max)	$72.50
Rockwood,Tenn. T3 (Phos. 0.035% max)	72.50
Steelton,Pa. B2 (Phos. 0.035% max)	66.50
Philadelphia, deld.	70.05
Troy,N.Y. R2 (Phos. 0.035% max)	66.50
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Duluth I-3 (Intermediate) (Phos. 0.036-0.075% max)	63.50
Erie,Pa. I-3 (Intermediate) (Phos. 0.036-0.075% max	63.50
Pittsburgh P6 (Intermediate) (Phos. 0.036-0.075% max)	63.50

Warehouse Steel Products

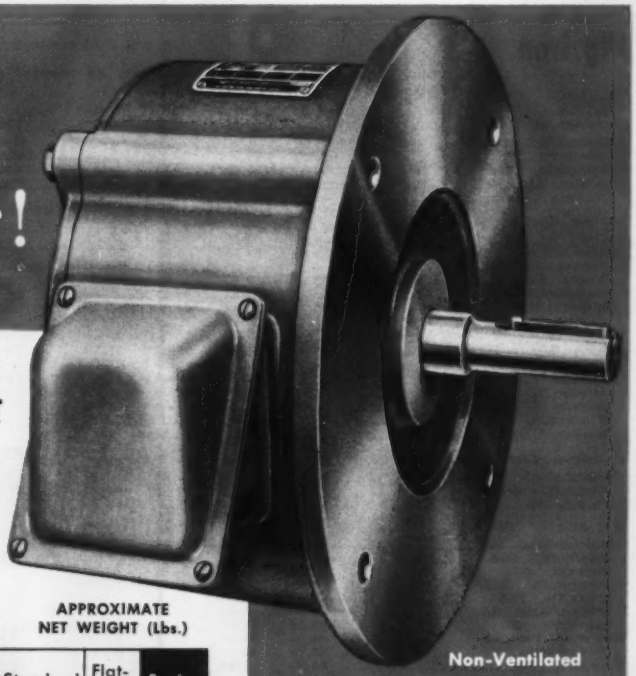
Representative prices, per pound, subject to extras, f.o.b. warehouse. City delivery charges are 15 cents per 100 lb except: St. Paul, 25 cents; Moline, Norfolk, Richmond, Washington, 20 cents; Baltimore, Boston, Los Angeles, New York, Philadelphia, Portland, San Francisco, 10 cents; Atlanta, Houston, Seattle, Spokane, no charge.

	SHEETS				STRIP	BARS				Standard Structural Shapes	PLATES	
	Hot-Rolled	Cold-Rolled	Gal. 10 Ga.†	Stainless Type 302	Hot-Rolled*	H.R. Merchant Qual.	H.R. Spec. Qual.	C.F. Rds.‡	H.R. Alloy 4140††[4]		Carbon	Floor
Atlanta	7.14	8.20	8.87	....	7.40	7.42	...	9.39	....	7.63	7.49	9.48
Baltimore	7.21	8.32	8.50	....	7.91	7.53	...	8.62[9]	13.49	7.93	7.21	8.98
Birmingham	7.00	8.24	8.85	....	7.21	7.27	7.80	9.35	....	7.43	7.14	9.34
Boston	7.88	8.81	10.27	53.32	7.96	7.87	8.40	9.67	13.50	8.13	8.20	9.47
Buffalo	7.05	8.25	10.01	....	7.35	7.35	8.20	7.90	13.35	7.60	7.35	8.90
Chattanooga	7.28	8.44	8.60	....	7.36	7.42	7.95	9.18	....	7.43	7.45	9.32
Chicago	7.13	8.24	9.10	46.75	7.21	7.27	7.80	7.75	13.05	7.43	7.45	8.61
Cincinnati	7.25	8.23	9.10	46.10	7.45	7.51	8.04	8.15	13.29	7.90	7.74	8.97
Cleveland	7.13	8.24	8.95	49.16	7.31	7.33	7.86	8.00	13.11	7.76	7.62	8.78
Detroit	7.19	8.43	9.38	43.50	7.49	7.55	8.08	8.04	13.25	7.90	7.42	8.80
Erie, Pa.	7.08	8.24	8.95[10]	....	7.31	7.35	...	8.10[10]	....	7.65	7.30	8.79
Houston	7.85	8.75	10.49	....	8.15	8.25	...	9.85	14.00	8.20	7.80	9.20
Jackson, Miss.	7.44	8.50	9.20	....	7.42	7.57	8.10	9.44	....	7.73	7.75	9.39
Los Angeles	8.50	10.00	11.00	51.50	8.35	8.15	8.70	10.90	14.35	8.30	8.75	10.85
Milwaukee	7.22	8.33	9.19	....	7.30	7.36	7.89	7.94	13.14	7.60	7.54	8.70
Moline, Ill.	7.15	8.44	8.85	....	7.41	7.43	...	8.10	....	7.63	7.34	...
New York	7.61	8.84	9.59	47.57	8.17	8.11	8.66	9.72	13.43	8.09	7.86	9.29
Norfolk, Va.	7.25	...	...	....	7.65	7.65	...	9.50	....	7.95	7.45	8.95
Philadelphia	7.32	8.42	9.37	45.98	7.93	7.68	8.21	8.46	13.21	7.74	7.68	8.80**
Pittsburgh	7.13	8.24	9.40	49.00	7.21	7.27	7.80	8.00	13.05	7.43	7.45	8.61
Portland, Oreg.	7.80	8.80	10.65	....	8.00	7.95	...	12.20	15.00	7.85	7.75	9.60
Richmond, Va.	7.25	...	9.49	....	7.85	7.85	8.38	9.50	....	8.10	7.50	9.35
St. Louis	7.42	8.53	9.69	43.89	7.50	7.56	8.09	8.29	13.34	7.83	7.74	8.90
St. Paul	7.46	8.59	9.16	....	7.72	7.74	...	8.51	13.51	7.94	7.65	9.12
San Francisco	8.10	9.65	10.15	51.65	8.35	8.10	8.65	11.40	14.30[9]	8.20	8.00	10.26
Seattle	8.65	10.40	10.80	54.00	8.90	8.60	9.15	12.10	14.65	8.40	8.40	10.65
Spokane	8.65	11.00[7]	10.80	....	8.90	8.60	9.15	12.10	15.40	8.40	8.40	10.60
Washington	7.59	8.70	7.97	....	8.12	8.08	...	9.09	....	8.51	7.91	9.36

*Prices do not include gage extras; †prices include gage and coating extras (based on 13.50-cent zinc), except in Birmingham (coating extra excluded); ‡includes 35-cent special bar quality extras; **¼-in. and heavier; ††as annealed; §§under ½-in.

Base quantities, 2000 to 4999 lb except as noted; Cold-rolled strip and cold-finished bars, 2000 lb and over except in Seattle, 2000 to 9999 lb, and in Los Angeles, 6000 lb and over; stainless sheets, 8000 lb except in Chicago, New York and Boston, 10,000 lb, and in San Francisco, 2000 to 4999 lb; hot-rolled products on West Coast, 2000 to 9999 lb; [8]—500 to 9999 lb; [4]—400 to 999 lb; [6]—4000 lb and over; [5]—1000 to 1999 lb; [6]—1000 lb and over; [7]—1500 to 3999 lb; [8]—2000 to 3999 lb; [9]—f.o.b. local delivery in lots of 10,000 lb and over; [10]—2000 lb and over.

The Motor you asked for!



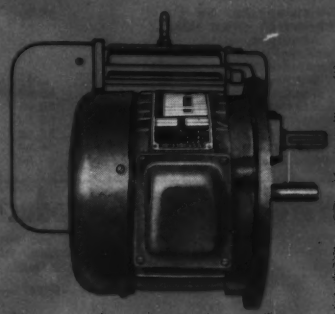
Non-Ventilated

TAKES less space . . . because it's the new FLAT-Type Motor

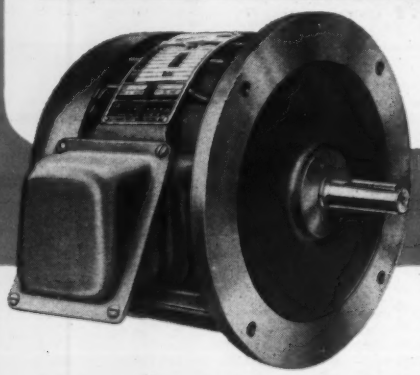
GIVES more service . . . because it's a DIEHL

FOR SIZE AND WEIGHT, COMPARE THE NEW FLAT-TYPE WITH STANDARD MOTORS

FRAME SIZE		OVERALL LENGTH (Inches)			APPROXIMATE NET WEIGHT (Lbs.)		
Standard	Flat-Type	Standard	Flat-Type	Saving	Standard	Flat-Type	Saving
DIF 182	DIF 180	14 1/16	10 3/4	3 5/16	82	59	23
DIF 213	DIF 220	17 3/16	11 9/16	5 5/8	128	83	45
DIF 284U	DIF 280	26	13 13/16	12 3/16	272	135	137



New Flat-Type superimposed on standard motor



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The unique and perfect answer in *integral motors*—designed especially for the machine tool and equipment industries. Packs full horsepower in less space . . . actually up to 48% shorter than standard motors without sacrifice in performance. Many pounds lighter, too, than conventional motors (over 50% in some cases), meaning vastly reduced over-hung weight. Standard radial construction, easy to disassemble and reassemble . . . no precision alignments or complicated air-gap adjustments to contend with. Totally-enclosed . . . no dirt, dust or moisture can get in. Available (non-ventilated) in ratings to 3 H.P., and (fan-cooled) in ratings to 20 H.P.

Perhaps the Diehl Flat-Type Motor is just what you need to solve your application problems. Give us the details and we'll be glad to submit recommendations. Ask for your copy of Bulletin S-3461.

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Electrical Division of THE SINGER MANUFACTURING COMPANY

Finderne Plant, SOMERVILLE, NEW JERSEY

ATLANTA • BALTIMORE • CHARLOTTE, N. C. • CHICAGO • CINCINNATI • DETROIT • MILWAUKEE • NEEDHAM, MASS. • NEW YORK • PHILADELPHIA • PITTSBURGH

It's not quite this easy, but lead has added a . . .

New Wrinkle in Plate Market

THERE'S something new in the plate market. It's leaded plate—a free machining, fully killed, forging quality plate which may save you money in your machining operations.

Take the case of Mechanical Mold & Machine Co., Akron. This large manufacturer of molds for producing rubber products had a contract to make the mold for the rubber gasket which fits around the door of a home freezer. Using ordinary mild or resulphurized steel, the job would have taken about 800 man-hours from start to finish—at about $5 an hour. Instead, the company used leaded plate and cut the job to 600 man-hours and claims it got a better product in the bargain.

Nothing New—There is nothing unusual about leaded steel as such. Inland Steel Co. has made leaded bars for years and has licensed 23 other domestic steel producers to use its process. But leaded plate has been on the market commercially only since last September. At present, Inland is the only producer, but any licensee with plate capacity is a potential supplier. Joseph T. Ryerson & Son Inc. is the distributor of the plate, known as New E-Z-Cut. It is a low-carbon steel with 0.15-0.35 lead added, produced in thicknesses up to 3 in.

Leaded plate has about the same proved advantages of other leaded stock. The foremost is its easy machinability. Machining time has been cut by one-third in many cases. In addition, less cutting power is required. H. E. Weidanz, purchasing agent for Mechanical Mold & Machine Co., says savings in tooling costs are threefold: Tool life is increased; it is possible to use oil-hardened cutting tools instead of the more expensive high-speed tools; and fewer tools are required. On many jobs, he says, two sets of tools must be made so that the last cut will be just the same as the first. With leaded plate, tool wear is so little that only one set of tools is required.

Extra Bargain—H. J. Heffner, Central Mold & Machine Co., Akron, says an additional saving is possible on planing operations. Using ordinary mild steel, he had to make a roughing cut before making the finishing cuts. With leaded plate, he eliminates the roughing cut on many jobs and still gets a good finish. This saves both tool costs and work time.

Another advantage is the reduction of scrap losses caused by "stringers" in the steel. For years this was a drawback of resulphurized steels. But the new leaded steel is clean.

Techniques — There are tricks to working with leaded plate, just as there are for any new metal. Some fabricators have reported difficulties with welding at first, but most users have found it can be welded with standard welding rods, using conventional methods. One Chicago firm which has just started welding leaded plate says: "If welds are of sufficient quality to withstand the tremendous abuse our products undergo, then it's conceivable that if leaded plate were available in unlimited quantities, we would convert 90 per cent of our plate requirements to it."

And there have been complaints that it does not machine as easily as mild steel in some cases. Most persons who have used it successfully say that such difficulties are encountered only when first using the steel. You don't machine leaded steel as you would plain mild steel. You have to experiment with the speeds and feeds to get best results.

Availability Problem — Currently, there are several drawbacks to the marketing of this product, Ryerson officials say. First is the generally tight position of plate in today's market, which is even more pronounced for leaded steel. Second is the development of markets. Developed originally for the rubber moldmakers in the Chicago and Akron areas, it is slowly finding its way into other shops where machining plate is required. E. D. Roberts, Akron sales representative for Ryerson, believes that within ten years, 65 to 80 per cent of all plate made for machining purposes will be leaded.

Plates . . .

Plate Prices, Page 226

Most platemakers think shipments this year will exceed the 6,760,000 tons they moved in 1955. Heavier tonnage will go to railroad car shops and the shipyards. Heavier plate consumption by builders of industrial equipment and the oil and gas industry is indicated. Nonresidential building needs and highway requirements continue pressing.

A high spot in industrial equipment demand, is for plates to be used in automobile presses for 1957 models. Fabricators of water tanks have big order backlogs but are handicapped by the shortage of plates in giving deliveries. The same is true of builders of barges and scows whose operations will be slowed by cuts in their second quarter plate allotments.

Not until more semifinished tonnage is diverted to the plate mills, or more sheet mills turn to production of light plates, will plate supply make much progress toward filling demand. The stringency appears even worse than it was 30 days ago.

Close to 17,000 tons are needed for scows and barges in the Nashville, Tenn., area. Shipyard requirements this year will be heavier than had been estimated earlier. Shipbuilders' backlogs have been increased by the addition of three tankers, one 46,000-ton (deadweight) ship to be built at Bethlehem's Quincy yard, and two 32,000-ton (deadweight), vessels to

be built at the Sparrows Point yard of that company. Sun Shipbuilding & Dry Dock Co., Chester, Pa., is apparent low bidder on a 25,500-ton national defense tanker. Demand for such vessels may be large in event of war. Sun bid $11,534,100 on a fixed price basis.

Steel Bars . . .

Bar Prices, Page 226

While there has been some easing in demand for hot-rolled carbon bars, orders are still running in excess of supply. Producers expect to book more tonnage than they can promptly handle in the second quarter.

In New England, except for ground and polished stock, bar schedules are easing slightly, with more hot-rolled available. April and May schedules in the area are well filled, but second quarter demand is less feverish than in recent months.

The bar mills are catching up on arrearages to some extent. Automotive requirements are off, but they are expected to spurt in May and June.

One producer of cold-finished bars is reported increasing thickness extras on cold-finished flats, over 6 in. in width, about 50 cents per 100 lb.

Annual reports of farm equipment manufacturers indicate growing inventories of tractors and equipment at factory and dealer levels. Barmarkers, however, report no cutting back in the industry's steel requirements. At this season, normally, implement inventories are large in anticipation of spring buying by farmers.

Tin Plate . . .

Tin Plate Prices, Page 228

Announcement of tin plate prices for the next contracting period, Apr. 1 to Oct. 1, is expected to come within the next week. While producers decline comment, the trade will not be surprised by a moderate increase.

Demand for tin plate is reported increasing. It is partly due to the building of inventories as a hedge against a shortage which could be caused by a steel strike at midyear.

Sheets, Strip . . .

Sheet & Strip Prices, Pages 227 & 228

Sheetmakers are under less pressure for shipments, chiefly because of cutbacks on automotive account. Still, they are a long way from being current with demand, except in galvanized sheets.

They are disposing of whatever surplus tonnage develops without much difficulty. But at some points, notably New England, a little more selling is required than formerly. In this area, inventories are heavier, and they are being bolstered by receipts of overdue shipments.

Despite the automotive slackening, not much excess tonnage has appeared in the over-all market, and most mills will enter the second quarter with substantial carry-overs. This applies to both hot and cold rolled; also enameling stock and other specialties.

Helping to sustain business is strong demand from manufacturers of stoves, light tanks, deep freezers, sanitary ware, metal furniture, cabinets, shelving, lockers, etc. Many customers still want more tonnage than has been allocated them.

The mills will have more business on their books than they can handle right through June. For example, Granite City Steel Co.'s February order volume was the highest in 16 months. This business is for second quarter shipment. Also, this company still is receiving conversion orders, chiefly plates.

Producers are confident the auto-

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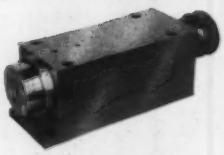

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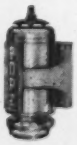

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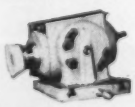

POPE SUPER-PRECISION MOTORIZED TOOL AND CUTTER GRINDER SPINDLES with clearance Angle Swiveling Heads for Angular Adjustment In A Vertical Plane

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POPE SUPER-PRECISION HIGH FREQUENCY HEAVY DUTY GRINDING AND MILLING SPINDLES for speeds up to 100,000 RPM

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makers will return to the market shortly for larger tonnage than they took in first quarter. The spring surge in motorcar buying is expected to restore zip to car manufacturing schedules.

Superior Steel Corp. raised prices on copper-clad strip Mar. 1, the advance reflecting recent increases in the price of copper.

Structural Shapes . . .

Structural Shape Prices, Page 226

Fabricating business is off to a "terrific start" this year, says the American Institute of Steel Construction.

January bookings hit an all-time monthly high of 405,263 tons. This was 68 per cent above bookings in January, 1955. Shipments of 250,155 tons were 11 per cent over those in January a year ago, though about on a par with those in December, 1955.

Order backlogs as of Jan. 31 totalled 2,407,609 tons, of which about half, or 1,176,256 tons, were scheduled for fabrication during the following four months. This reserve is 75 per cent above that accounted for last year at this time.

Inquiry is somewhat livelier, though involving few outstanding orders. Public utility work and general industrial construction needs are rising. In the New York market there is a good diversity of commercial building. Pending office building construction is featured by a 38-story structure with exterior walls of bronze and glass to be erected for Joseph E. Seagram & Sons Inc. at 375 Park avenue.

Some 12,000 tons of structural steel will be required for the framework. Bethlehem Steel Co. will be the fabricator and erector. A contract has been awarded the General Bronze Corp., Garden City, N. Y., for 1600 tons of bronze for the structure—153,000 of the 275,000 sq ft of exterior to be of bronze; the remainder will be glass. Bronze has been used for centuries in interiors and (more recently) in a limited way for exterior decoration, but never to provide exterior walls for a whole building, according to Aaron S. Saphier, president, General Bronze Corp.

Bridge work continues prominent in the structural picture, currently undergoing seasonal expansion. In New England, tonnage is more widely distributed as shop deliveries extend beyond completion schedules. Competition among fabricators continues keen, even though most shops are well booked ahead.

Wire . . .

Wire Prices, Pages 228 & 229

Republic Steel Corp. revised its method of quoting nail prices (effective Mar. 6).

Prices at its two nail-making plants—Alabama City, Ala., and South Chicago, Ill.—have been on the columnar basis, with a quotation of column 152. Republic will continue to use the columnar method of pricing but will add a fourth digit. Its new price will be column 1523, which means the new price is column 152, plus 3 cents per 100 lb.

A column number of 152 meant the price was approximately $152 a ton. Every point of change represented $1 a ton. But, Republic increased its price only 60 cents a ton, so it made the modification in the columnar method of pricing to reflect the fractional increase.

Mid-States Steel & Wire Co. adopted this method for pricing nails at Jacksonville, Fla., some weeks ago. It quotes column 162, plus 4 cents per 100 lb.

Republic also increased prices on bale ties, now quoting column 175 against column 173, at Alabama City

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and South Chicago. Automatic baler wire, at the same time, was raised 10 cents per box, and merchant quality wire, 10 cents per 100 lb.

Heavy sustained demand for wire rods contrasts with slackening orders for manufacturers wire, notably in New England. Buying for furniture coils is heavier, but automotive cutbacks are not balanced by new volume. Heading wire is in spotty demand. Some screw manufacturers are holding up shipments, but others are taking their normal tonnage.

Demand is brisk for higher carbon specialties and low carbon wire for fabric mesh and construction. In some cases, the shortage of rods is forcing consumers to buy finished wire.

Tubular Goods . . .

Tubular Goods Prices, Page 230

Seamless pipe inquiry is backing up, notably in New England. Shipments are 30 days behind schedule on 12 in. and under, and are more extended on new orders, with April production on the larger sizes blanked out. Distributors are generally on an order basis of 90-day lead time.

Large volume needed for pipe piling and highway is unplaced. Mechanical and pressure tubing are more active, deliveries running six to eight weeks. Alloy and stainless shipments extend 12 to 14 weeks Buttweld pipe can be bought for prompt shipment from stock to three weeks from mills.

An 83-mile pipeline, Glenn county, Calif., to Sacramento, is planned by the Pacific Gas & Electric Co. Also, Pacific Lighting Corp. subsidiaries plan a pipeline from Topock on the California-Arizona line to Newhall and Alhambra in southern California.

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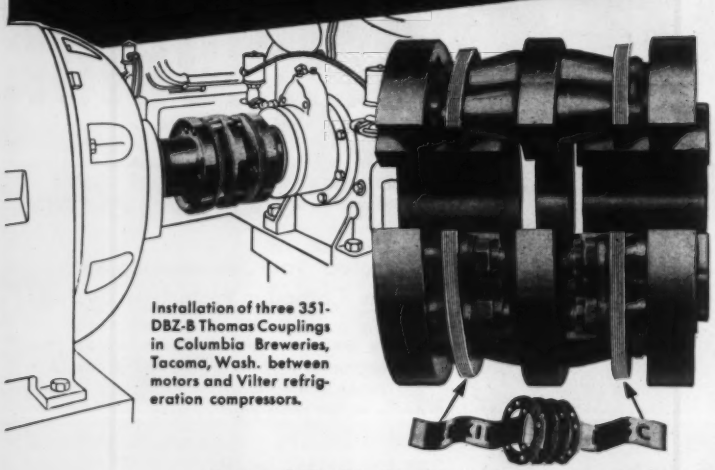

Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
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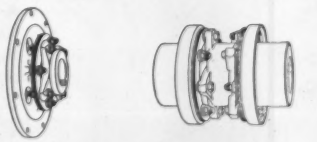
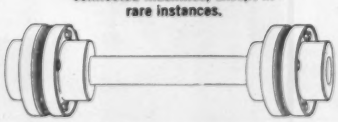
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



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Warehouse . . .

Warehouse Prices, Page 231

Distributors' bookings are limited by the amount of tonnage they can obtain from the mills. Stringency is pronounced in plates and shapes. Stocks are unbalanced in sheet, although improved since January.

Activity in construction and related industries is expected to increase as usual this spring, requiring larger steel tonnages, especially shapes, wire, nails, strip steel and galvanized sheets.

Warehouse prices will likely move upward soon to reflect changes in freight rates.

Fasteners . . .

Bolt, Nut, Rivet Prices, Page 229

Bethlehem Pacific Coast Steel Corp. is producing hexagon head cap screws at its Los Angeles plant. Addition of this product rounds out a complete fastener line for the company's distributors in the seven western states.

Made to the new standard ASA B18.2-1955, two types of cap screws are available in a complete range of sizes—low carbon bright and high carbon heat treated, both in the coarse thread and fine thread series.

Important uses include integral parts for the assembly of agricultural implements, automobiles, all types of industrial machinery and equipment.

Iron Ore . . .

Iron Ore Prices, Page 241

Great Lakes vessel operators will increase transportation rates on iron ore, coal and limestone an average of 6 per cent when the '56 navigation season opens.

Iron ore rates, up 10 cents per ton, will be $1.80 per ton from the head of Lake Superior to lower lake ports; $1.62, Marquette to lower lake ports;

$1.35, Escanaba to Lake Erie ports; $1.08, Escanaba to the Chicago district.

The rate on coal shipped to the head of Lake Superior will be unchanged at 70 cents a ton. Rates are up 6 per cent on shipments to other points: 95 cents, lower lake ports to Lake Michigan south of the Illinois-Wisconsin line; 82 cents, to Lake Michigan north of that line.

Shipping rates for iron ore and limestone were increased 10 cents a ton last July. Coal rates were raised 6 cents at that time.

All taconite units at Reserve Mining Co.'s E. W. Davis Works, Silver Bay, Minn., are ready for quantity production. First taconite pellets were produced Oct. 21. Since then, a stockpile of 560,000 gross tons has been accumulated. This will be shipped to the Armco Steel Corp. and Republic Steel Corp. furnaces when the lake navigation season opens. Both companies jointly own the $190-million taconite project. The plant will turn out 3,750,000 tons of taconite pellets annually when it attains capacity production.

More than 14 million tons of iron ore were produced by U. S. mines operated by the M. A. Hanna Co. last year. An additional 2 million tons of Lake Superior ore were obtained from other sources by the company. With production of 8.5 million tons in the Quebec-Labrador fields, about 50 per cent greater than originally scheduled, M. A. Hanna last year handled a total of more than 24 million tons of iron ore.

The Iron Ore Co. of Canada's Labrador project should be capable of producing in excess of 10 million tons annually after its completion in 1956.

The Hanna company reports its new nickel smelting plant near Riddle, Oreg., should be completed this year. Two of the planned four furnaces were operated during most of 1955, producing about 6.5 million lb of high quality ferronickel. About 1 million lb were released by the government for industrial use to ease the severe nickel shortage. The plant processes ore from Hanna Coal & Ore Corp.'s Nickel Mountain mine, the largest known deposit of its type in this country.

Pig Iron . . .

Pig Iron Prices, Page 231

Most foundries have pig iron inventories of 30 to 45 days. They may try to enlarge them as a hedge against possible early price increases.

With heavy lake shipments to Detroit scheduled in a few weeks, merchant iron producers at Buffalo continue to operate at capacity.

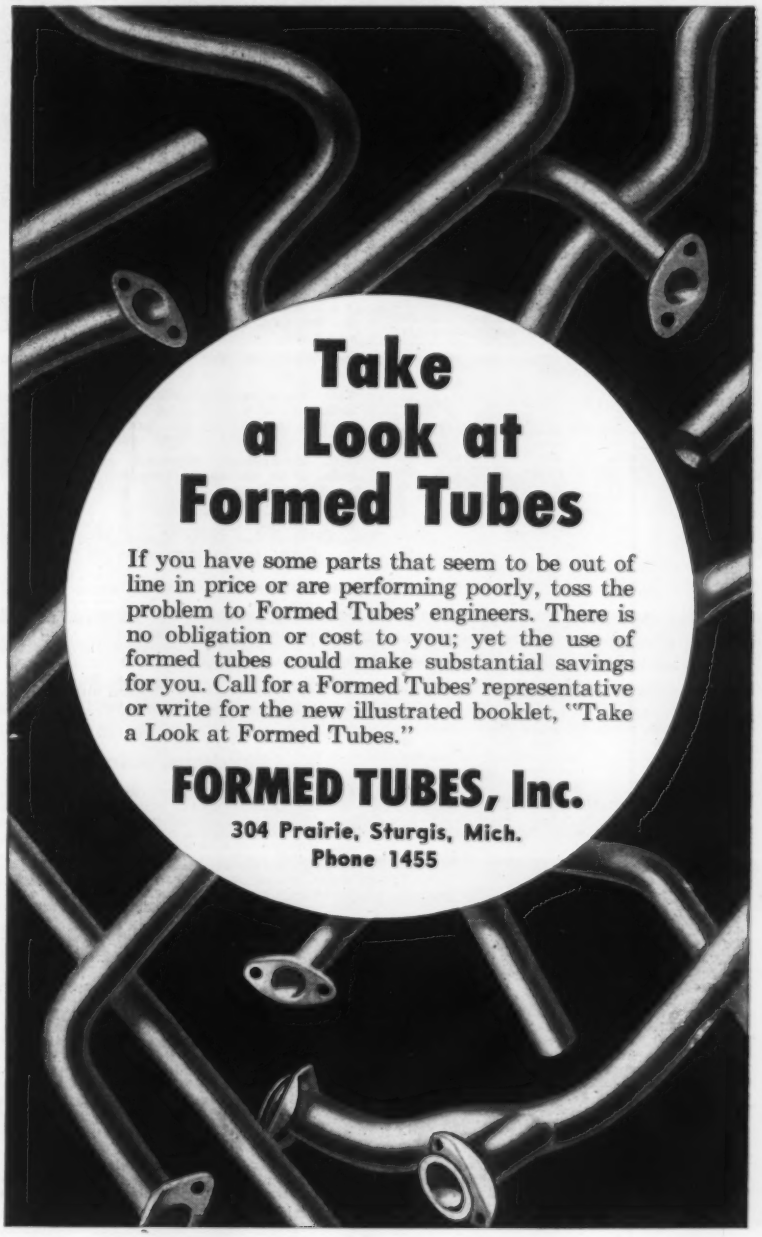
A strike Feb. 29 at the North Birmingham, Ala., pipe foundry of U. S. Pipe & Foundry Co. resulted in the closing of three of the firm's plants in that area.

By relighting its No. 1 blast furnace at the Edgar Thomson Works at Braddock, Pa., on Mar. 6, U. S. Steel Corp. had its entire complement of 28 blast furnaces in the Monongahela Valley in production.

It is the second time this year, and the fifth in the history of the corporation, that this has happened. All units were operating in January when the Duquesne Works placed its No. 5 blast furnace in production.

On Feb. 1, U. S. Steel took the daily producer of 1330 net tons of basic iron at Braddock out of production and has relined the stack from the mantle up.

The 100-per-cent blast furnace schedule will be in effect only about two weeks. It is planned to take Carrie No. 6 furnace at the Homestead Works out of production for relining.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Current Ferroalloy Quotations

MANGANESE ALLOYS

Spiegeleisen: Carlot, per gross ton, Palmerton, Pa. 21-23% Mn, $94; 19-21% Mn, 1-3% Si, $91.50; 16-19% Mn, $89.50.

Standard Ferromanganese: (Mn 74-76%, C 7% approx.) Base price per net ton $205. Duquesne, Johnstown, Sheridan, Pa.; Philo, O.; Tacoma, Wash.; Alloy, W. Va.; Ashtabula, Marietta, O.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively.

(Mn 79-81%). Lump $213 per net ton, f.o.b. Anaconda or Great Falls, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max, 0.07% C, 30.95c per lb of contained Mn, carload packed 32c, ton lots 33.5c, less ton 34.7c. Delivered. Deduct 1.5c for max 0.15% C grade from above prices, 3c for max 0.30% C, 3.5c for max 0.50% C, and 6.5c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max). Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk 22.35c per lb of contained Mn, packed, carload 23.4c, ton lot 25c, less ton 26.2c. Delivered. Spot, add 0.25c.

Manganese Metal: 2" x D (Mn 95.5% min, Fe 2% max, Si 1% max, C 0.2% max): Carload, lump, bulk, 45c per lb of metal; packed, 45.75c; ton lot 47.25c; less ton lots 49.25c. Delivered. Spot, add 2c.

Electrolytic Manganese Metal: Min carload, 30c; 2000 lb to min carload, 32c; 250 lb to 1999 lb, 34c. Premium for hydrogen-removed metal, 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Contract, lump, bulk 1.50% C grade, 18-20% Si, 11.5c per lb of alloy. Packed, c.l. 12.5c, ton 12.95c, less ton 13.95c, f.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., Portland, Oreg. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.4c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 4% max, C 0.10% max). Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lots $1.35, less ton $1.37 f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $200 per ton, f.o.b. Niagara Falls, N.Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%). Contract $225 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, c.l., lump, bulk 26.25c per lb of contained Cr; c.l. packed 27.5c, ton lot 29.25c, less ton 30.65c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome: (Cr 67-71%). Contract, carload, lump, bulk, C 0.025% max (Simplex) 31.75c per lb contained Cr, 0.02% max 38.50c, 0.03% max 38c, 0.06% max 36.50c, 0.1% max 36c, 0.15% max 35.75c, 0.2% max 35.50c, 0.5% max 35.25c, 1.0% max 34c, 1.5% max 33.85c, 2.0% max 33.75c. Ton lot, add 3.1c, less ton add 4.8c. Carload packed add 1.45c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). Contract, c.l. 2 in. x D, bulk 27.4c per lb contained Cr. Packed, c.l. 28.7c, ton 30.5c, less ton 32c. Delivered. Spot, add 0.25c.

Foundry Ferrochrome, Low-Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max). Contract, carload, packed 8 M x D, 19.6c per lb of alloy, ton lot 20.85c; less ton lot, 22.05c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome-Silicon: (Cr 39-41%, Si 42-49%, C 0.05% max). Contract, carload, lump, 4" x down and 2" x down, bulk, 39.05c per lb of contained Cr; 1" x down, bulk 39.8c. Delivered.

Chromium Metal, Electrolytic: Commercial grade (Cr 99.8% min, metallic basis, Fe 0.2 max). Contract, carlot, packed 2" x D plate (about ⅛" thick) $1.25 per lb, ton lots $1.27, less ton lots $1.29. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open-hearth Grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.10 per lb of contained V. Delivered. Spot, add 10c. **Special Grade** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.20. **High Speed Grade** (V 50-55%, or 70-75%, Si 1.50% max, C 0.20% max) $3.30.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots, packed, $1.33 per lb contained V_2O_5, freight allowed. Spot, add 5c.

SILICON ALLOYS

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.0c per lb of contained Si. Packed 21.40c; ton lot 22.50c f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.75c per lb of contained Si. Packed, c.l. 14.85c, ton lot 16.3c, less ton 17.95c. F.o.b. Alloy, W. Va., Ashtabula, O., Marietta, O., Sheffield, Ala., and Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.2c to 50% ferrosilicon prices.

65% Ferrosilicon: Contract, carload, lump, bulk, 14.5c per pound contained silicon. Packed, c.l. 16.2c, ton lots, 18c; less ton, 19.35c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Contract, carload, lump, bulk, 15.4c per lb of contained Si. Packed, c.l. 17.05c, ton lot 18.7c, less ton 19.95c. Delivered. Spot, add 0.3c.

90% Ferrosilicon: Contract, carload, lump, bulk, 18.5c per lb of contained Si. Packed, c.l. 19.95c, ton lot 21.35c, less ton 22.4c. Delivered. Spot, add 0.25c.

Silicon Metal: (Min 98% Si, 0.75% max Fe, 0.07 max Ca). C.l. lump, bulk, 20.5c per lb of Si. Packed, c.l. 21.95c, ton lot 23.25c, less ton 24.25c. Add 0.5c for max 0.03 Ca grade. Deduct 0.5c for max 2% Fe grade analyzing min 96.5% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 10.65c per lb of alloy, ton lots packed 11.8c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l. lump, bulk 8.5c, per lb of alloy. Packed, c.l. 9.5c, ton lot 10.65c, less ton 11.5c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Contract, carload, lump, packed 26.25c per lb of alloy, ton lot 27.4c, less ton 28.65c. Freight allowed. Spot, add 0.25c.

BORON ALLOYS

Ferroboron: (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D. $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices, 100 lb and over, are as follows: Grade A (10-14% B) 85c per pound; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5%-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%). Contract, lump, carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 22c per lb of alloy, carload packed 23.05c, ton lot 24.95c, less ton 25.95c. Delivered. Spot, add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Contract, carload, lump, bulk 21.5c per lb or alloy, carload packed 22.95c, ton lot 25.25c, less ton 26.75c. Delivered. Spot, add 0.25c.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx. 3½ lb each and containing 2 lb of Cr). Contract, carload, bulk, 16.95c per lb of briquet, carload packed in box pallets 17.15c, in bags 17.85c; 3000 lb to c.l. in box pallets 18.35c; 2000 lb to c.l. in bags, 19.05c; less than 2000 lb in bags 19.95c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing 2 lb of Mn). Contract, carload, bulk 12.5c per lb of briquet, c.l. packed, pallets 12.7c, bags 13.5c; 3000 lb to c.l., pallets 13.9c; 2000 lb to c.l., bags, 14.7c, less ton 15.6c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing 2 lb of Mn and approx. ½ lb or Si). Contract, c.l. bulk 13.15c per lb of briquet, c.l. packed, pallets, 13.35c; bags 14.15c, 3000 lb to c.l., pallets, 14.55c; 2000 lb to c.l., bags, 15.35c; less ton 16.25c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing 2 lb of Si). Contract, carload, bulk 7.15c per lb of briquet; packed, pallets, 7.35c; bags, 8.15c; 3000 lb to c.l., pallets, 8.95c; 2000 lb to c.l. bags 9.75c; less ton 10.65c. Delivered. Spot, add 0.25c. (Small size—Weighing approx. 2½ lb and containing 1 lb of Si). Carload, bulk 7.3c. Packed, pallets 7.5c; bags 8.30c; 3000 lb to c.l. pallets 9.1c; 2000 to c.l. bags 9.9c; less ton 10.8c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.33 per pound of Mo contained, f.o.b. Langeloth, Pa.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%), 5000 lb W or more $3.45 per lb of contained W; 2000 lb W to 5000 lb W, $3.55; less than 2000 lb W, $3.67. Delivered.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 8% max, C 0.4% max). Contract, ton lot, 2" x D, $6.90 per lb of contained Cb. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb plus Ta 60% min C 0.30% max). Ton lots, 2" x D, $4.65 per lb of contained Cb plus Ta, delivered; less ton lots $4.70.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.) Contract, c.l. packed ½ in. x 12 M, 18.5c per lb of alloy, ton lots 19.65c, less ton 20.9c. Delivered. Spot, add 0.25c.

Graphidox No. 5: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18.5c per lb of alloy, ton lots 19.65c; less ton lots 20.9c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 17.2c per lb of alloy; ton lots 18.7c; less ton lots 19.95c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx. 20% each Si, Mn, Al; bal. Fe). Lump, carload, bulk 17.50c. Packed c.l. 18.50c, 200 lb to c.l. 19.50c, less than 2000 lb 20c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $4 for each 1% of P above or below the base; caload, f.o.b. sellers' works, Mt. Pleasant, Siglo, Tenn., $90 per gross ton.

Ferromolybdenum: (55-75%). Per lb contained Mo, in 200-lb containers, f.o.b. Langeloth, Pa., $1.54 in all sizes except powdered which is $1.66; Washington, Pa., furnace, any quantity $1.46.

Technical Molybdic-Oxide: Per lb contained Mo, f.o.b. Langeloth, Pa.; $1.31 in cans; in bags, $1.30, f.o.b. Langeloth, Pa.; $1.24, Washington, Pa.

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Ores

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(Prices effective for the 1956 shipping season, gross ton, 51.50% iron natural, rail of vessel, lower lake ports)

Old range bessemer $11.25
Old range nonbessemer 11.10
Mesabi bessemer 11.00
Mesabi nonbessemer 10.85
Open-hearth lump 12.10
High phos. 10.85

The foregoing prices are based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Dec. 1, 1955, and increases or decreases after such date are for seller's account.

Eastern Local Iron Ore

Cents per unit, deld. E. Pa.

Foundry and basic 52-62% concentrates contract 17.00-18.00

Foreign Iron Ore

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60-68% 20.00
N. African hematite (spot)...nom. 18.00-20.00
Brazilian iron ore, 68-69% (spot)..26.00-28.00

Tungsten Ore

Net ton unit, before duty

Foreign, wolframite, good commercial quality .....$34.00-$34.50
Domestic, scheelite, mine 63.00

Manganese Ore

Mn 48%, nearby, $1.06-$1.11 per long ton unit, c.i.f. U. S. ports, duty for buyer's account; 46-47%, 95c-$1.00.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and African

48% 2.8:1 .....nom. $45.00-$50.00
48% 3:1 .....42.00-44.00
48% no ratio 34.00

South African Transvaal

44% no ratio .....$19.00-$20.00
48% no ratio 33.00-35.00

Domestic

Rail nearest seller

18% 3:1 .....$39.00

Molybdenum

Sulphide concentrate, per lb of Mo content, mines, unpacked $1.10

Antimony Ore

Per unit of Sb content, c.i.f. seaboard

55-60% .....$3.60-$3.85
60-65% 3.85-4.00

Vanadium Ore

Cents per lb V_2O_5 content, deld. mills

Domestic 31.00

Refractories

Fire Clay Brick (per 1000)

High-Heat Duty: Ashland, Grahn, Hayward, Hitchins, Haideman, Olive Hill, Ky., Athens, Troup, Tex., Beech Creek, Clearfield, Curwensville, Lock Haven, Lumber, Orviston, West Decatur, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parral, Portsmouth, O., Ottawa, Ill., Stevens Pottery, Ga., $122; Salina, Pa., $127; Niles, O., $133.

Super-Duty: Ironton, O., Vandalia, Mo., Olive Hill, Ky., Clearfield, Pa., New Savage, Md., St. Louis, $150.

Silica Brick (per 1000)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Pa., Ensley, Ala., Windham, Portsmouth, O., Hawstone, Pa., $128; Warren, Niles, O., Hays, Pa., $133; Morrisville, Pa., $131.50; E. Chicago, Ind., Joliet, Rockdale, Ill., $138; Lehigh, Utah, $144; Los Angeles, $151.

Super Duty: Hays, Sproul, Hawstone, Pa., Warren, Windham, O., Leslie, Md., Athens, Tex., $145; Morrisville, Pa., Niles, O., $148; Joliet, Ill., $151; Curtner, Calif., $163.

Semisilica Brick (per 1000)

Clearfield, Pa., $139; Philadelphia, $124; Woodbridge, N. J., $122.

Ladle Brick (per 1000)

Dry Pressed: Alsey, Ill., Chester, New Cumberland, W. Va., Freeport, Johnstown, Merrill Station, Pa., Mexico, Vandalia, Mo., $88.50; Wellsville, O., $92.50; Clearfield, Pa., Portsmouth, O., $98.

High-Alumina Brick (per 1000)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $194; Danville, Ill., $197; Philadelphia, Clearfield, Pa., $201.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $241; Danville, Ill., $244; Philadelphia, Clearfield, Pa., $248.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $279; Danville, Ill., $281; Clearfield, Pa., Philadelphia, $286.

Sleeves (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $157; Clearfield, Pa., $158.50; St. Louis, $169.30.

Nozzles (per 1000)

Reesdale, Pa., $253.70; Johnstown, Pa., $259.20; Clearfield, Pa., $259.40; St. Louis, $259.45; Bridgeburg, Pa., $258.

Runners (per 1000)

Reesdale, Johnstown, Bridgeburg, Pa., $196; Clearfield, Pa., $198; St. Louis, $195.80.

Dolomite (per net ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, O., Gibsonburg, Narlo, O., $15; Thornton, McCook, Ill., $15.60; Dolly Siding, Bonne Terre, Mo., $14.

Magnesite (per net ton)

Domestic, dead-burned, bulk, ⅛-in. grains with fines: Chewelah, Wash., $40; Luning, Nev., $40. ⅝-in. grains with fines: Baltimore, $66.40.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, furnace $13.75-14.50
Connellsville, foundry 16.00-17.00

Oven Foundry Coke

Birmingham, ovens $25.65
Cincinnati, deld. 30.58
Buffalo, ovens 27.50
Buffalo, deld. 28.75
Camden, N. J., ovens 26.50
Chicago, ovens 27.00
Chicago, deld. 28.50
Detroit, ovens 27.50
Detroit, deld. 28.50
Pontiac, deld. 29.06
Saginaw, deld. 30.58
Erie, Pa., ovens 27.50
Everett, Mass., ovens
New England, deld. *28.55
Indianapolis, ovens 26.75
Ironton, O., ovens 26.00
Cincinnati, deld. 28.59
Kearny, N. J., ovens 26.75
Lone Star, Tex., ovens 19.50
Milwaukee, ovens 27.50
Neville Island, (Pittsburgh) Pa., ovens.. 26.25
Painesville, O., ovens 27.50
Cleveland, deld. 29.43
Philadelphia, ovens 26.50
St. Louis, ovens 28.50
St. Paul, ovens 26.50
Swedeland, Pa., ovens 26.50
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8, 9, 10	60	24.25
12	72	27.25
14	60	23.50
16	72	22.50
17	60	23.00
18	72	22.50
20	72	22.25

CARBON

8	60	12.10
10	60	11.80
12	60	11.75
14	60	11.70
14	72	10.85
17	60	10.75
17	72	10.35
20	84	10.30
20	90	10.10
24	72, 84	10.30
24	96	10.05
30	84	10.20
40, 35	110	9.90
40	100	9.90

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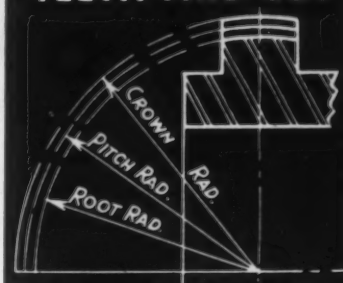

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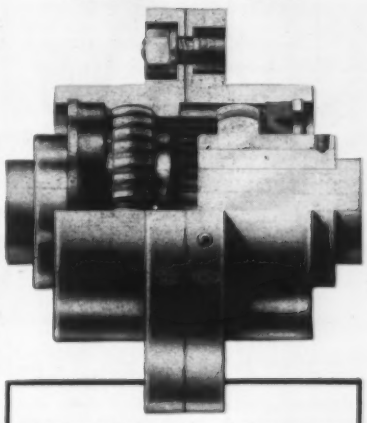

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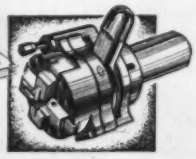

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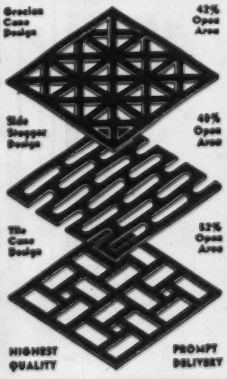

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Scrap . . .

Scrap Prices, Page 244

Pittsburgh—Scrap is firming after a steady decline. Brokers must pay more for No. 1 and No. 2 heavy melting, but there's still weakness in No. 2 bundles. A Pittsburgh area mill bought a small lot of No. 1 heavy melting at a price equal to $49 last week.

Cleveland — A slightly stronger tone prevails in the local scrap market, but prices are unchanged. Substantial tonnage purchase of steelmaking grades at $53 by a Valley mill serves to give market support here. So does the stronger tone that has developed in the Pittsburgh market where a small sale of No. 1 heavy melting is reported at $49. Foundry grades of scrap are moving steadily at unchanged prices. Supplies are adequate though tonnage coming from automotive plants is reported off more than 30 per cent.

Boston—Borings and turnings are slightly firmer, with brokers increasing their buying prices $1 per ton on the average. Buying is light, including cast grades at unchanged prices. Exports are slow. Only light tonnage is moving to docks at $40-$41, shipping point, within the $4 freight area.

Philadelphia—Sentiment continues to ease in the scrap market, but only two grades have been reduced in price recently: No. 2 heavy melting, now quoted at $43, and No. 2 bundles, $40. Both are off $1 a ton. Of all the open hearth grades, No. 2 bundles appear definitely the easiest and No. 1 heavy melting steel the strongest. Trading in the steel grades is light, with most mills having fair inventories.

New York—Less scrap is coming out, but brokers have not found it necessary to revise their buying prices. They are obtaining enough material to meet the conservative needs of consumers.

Buffalo—A leading consumer purchased secondary grades of scrap at $2 under previously prevailing prices. It paid $39 for No. 2 heavy melting and $36 for No. 2 bundles. The purchase included short shoveling turnings at $30 and mixed borings and turnings at $29, both off $1. No. 1 heavy melting continues nominally unchanged at $47, with brokers paying around that price in covering old orders. Low phos and railroad grades continue to command top prices. Cast is unchanged but is moving slowly.

Cincinnati — Scrap prices have reached a plateau and are expected to hold there for awhile. There is little difficulty in obtaining tonnage at the going market level.

Youngstown—Some changes in district scrap requirements here may come when U. S. Steel Corp. blows in a long idle blast furnace at its Ohio Works and blows out two other currently active stacks for rebuilding. One blast furnace at the Campbell Works of Youngstown Sheet & Tube Co. will be blown in shortly, following a relining job.

Detroit—The scrap market is quiet, and prices are unchanged. Steel ingot production in the district is estimated at 97.4 per cent of capacity, against 97.2 a week ago and 88 a year ago. Should a strike at the plant of Rotary Electric Steel Co. end, the ingot rate would rise quickly to 102.2 per cent.

Chicago—A good volume of scrap buying suggests that stabilization of the market has been effected. There is evidence some prices will strengthen a bit. Some consumers of blast furnace grades find themselves unable to purchase additional material at the levels which have been prevailing. No. 1 railroad heavy melting steel is stronger by $1 a ton.

St. Louis—Somewhat firmer tendencies are noted in the scrap market here. Several grades turned slightly upward for the first time in a month. Further advances are anticipated.

Birmingham — Scrap is moving slowly, except for the cast grades, and their movement may drop off this week because of a strike at the plant of U. S. Pipe & Foundry Co. Limited quantities of No. 1 steel were sold at prices $2 under those recently quoted. Brokers and dealers, expecting a substantial open-hearth scrap buy this week, are not pressing the market. Electric furnace grades are in good demand, but dealers are reluctant to sell at the present market level.

Los Angeles—With scrap stocks rising, dealers are curtailing collections. Volume in February was equal to that in January.

San Francisco—Steel scrap prices are off another $4 to $6 per ton, the second decline in a little more than a month. Available supplies are heavy.

Seattle—Further price adjustments have brought the scrap market down $10 from its recent peak. Buying is off, both on domestic and foreign account. No. 1 and No. 2 heavy melting steel are quoted at $38 and $35, respectively; No. 1 bundles, $35; No. 2, $26; No. 3, $17; electric furnace grades, $50; cupola cast, $45; break-

(*Please turn to page* 246)

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Iron and Steel Scrap

Consumer prices, per gross ton, except as otherwise noted, including broker's commission, as reported to STEEL. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Mar. 7	$48.50
Feb. 29	48.17
Feb. Avg.	48.96
Mar. 1955	37.50
Mar. 1951	44.00

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	*48.00-49.00*
No. 2 heavy melting	*44.00-45.00*
No. 1 bundles	*48.00-49.00*
No. 2 bundles	40.00-41.00
No. 1 busheling	*48.00-49.00*
Machine shop turnings	33.00-34.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	36.00-37.00
Cast iron borings	36.00-37.00
Cut structurals, 3 ft lengths	*55.00-56.00*
Heavy turnings	44.00-45.00
Punching & plate scrap	*55.00-56.00*
Electric furnace bundles	52.00-53.00

Cast Iron Grades

No. 1 cupola	48.00-49.00
Charging box cast	45.00-46.00
Heavy breakable cast	45.00-46.00
Unstripped motor blocks	32.00-33.00
No. 1 machinery cast	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt.	54.00-55.00
Rails, 2 ft and under	66.00-67.00
Rails, 18 in. and under	67.00-68.00
Rails, random lengths	62.00-63.00
Railroad specialties	60.00-61.00

Stainless Steel Scrap

18-8 bundles & solids	340.00-350.00
18-8 turnings	235.00-245.00
430 bundles & solids	110.00-120.00
430 turnings	60.00-65.00

CLEVELAND

No. 1 heavy melting	49.00-50.00
No. 2 heavy melting	45.00-46.00
No. 1 bundles	49.00-50.00
No. 2 bundles	38.00-39.00
No. 1 busheling	49.00-50.00
Machine shop turnings	29.00-30.00
Mixed borings, turnings	33.00-34.00
Short shovel turnings	33.00-34.00
Cast iron borings	33.00-34.00
Low phos.	55.00-56.00
Cut structural plates 2 ft and under	55.00-56.00
Alloy free, short shovel turnings	37.00-38.00
Electric furnace bundles	50.00-51.00

Cast Iron Grades

No. 1 cupola	54.00-55.00
Charging box cast	47.00-48.00
Stove plate	52.00-53.00
Heavy breakable cast	46.00-47.00
Unstripped motor blocks	*30.00-32.00*
Brake shoes	41.00-42.00
Clean auto cast	54.00-55.00
Burnt cast	41.00-42.00
Drop broken machinery	55.00-56.00

Railroad Scrap

No. 1 R.R. heavy melt.	53.00-54.00
R.R. malleable	59.00-60.00
Rails, 2 ft and under	67.00-68.00
Rails, 18 in. and under	68.00-69.00
Rails, random lengths	61.00-62.00
Cast steel	58.00-59.00
Railroad specialties	58.00-59.00
Uncut tires	59.00-60.00
Angles, splice bars	62.00-63.00
Rails, rerolling	67.00-68.00

Stainless Steel

(Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	340.00-350.00
18-8 turnings	200.00-210.00
430 clips, bundles, solids	105.00-115.00
430 turnings	55.00-65.00

YOUNGSTOWN

No. 1 heavy melting	52.00-53.00
No. 2 heavy melting	41.00-42.00
No. 1 bundles	52.00-53.00
No. 2 bundles	38.00-39.00
No. 1 busheling	52.00-53.00
Machine shop turnings	29.00-30.00
Short shovel turnings	34.00-35.00
Cast iron borings	34.00-35.00
Low phos.	53.00-54.00
Electric furnace bundles	53.00-54.00

Railroad Scrap

No. 1 R.R. heavy melt.	53.00-54.00

CHICAGO

No. 1 heavy melting	46.00-48.00
No. 2 heavy melting	37.00-38.00
No. 1 factory bundles	48.00-49.00
No. 1 dealer bundles	45.00-46.00
No. 2 bundles	35.00-36.00
No. 1 busheling	46.00-48.00
Machine shop turnings	25.00-26.00
Mixed borings, turnings	27.00-28.00
Short shovel turnings	27.00-28.00
Cast iron borings	27.00-28.00
Cut structurals, 3 ft	52.00-53.00
Punchings & plate scrap	53.00-54.00

Cast Iron Grades

No. 1 cupola	46.00-47.00
Stove plate	*39.00-40.00*
Unstripped motor blocks	36.00-37.00
Clean auto cast	51.00-52.00
Drop broken machinery	51.00-52.00

Railroad Scrap

No. 1 R.R. heavy melt.	*50.00-51.00*
R.R. malleable	58.00-59.00
Rails, 2 ft and under	63.00-64.00
Rails, 18 in. and under	64.00-65.00
Angles, splice bars	61.00-62.00
Rails, rerolling	65.00-66.00

Stainless Steel Scrap

18-8 bundles & solids	325.00-340.00
18-8 turnings	230.00-240.00
430 bundles & solids	105.00-110.00
430 turnings	45.00-50.00

DETROIT

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	45.00
No. 2 heavy melting	32.00
No. 1 bundles	45.00
No. 2 bundles	33.00
No. 1 busheling	45.00
Machine shop turnings	22.00
Mixed borings, turnings	22.00
Short shovel turnings	25.00
Punching & plate scrap	54.00

Cast Iron Grades

No. 1 cupola	43.00
Charging box cast	37.00
Stove plate	37.00
Heavy breakable	35.00
Unstripped motor blocks	25.00
Clean auto cast	46.00
Malleable	42.00

BIRMINGHAM

No. 1 heavy melting	*39.00-40.00*
No. 2 heavy melting	37.00-38.00
No. 1 bundles	*39.00-40.00*
No. 2 bundles	28.00-29.00
No. 1 busheling	*39.00-40.00*
Cast iron borings	20.50-21.50
Short shovel turnings	*29.00-30.00*
Machine shop turnings	*28.00-29.00*
Electric furnace bundles	44.00-45.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	47.50-48.00
Stove plate	44.50-45.50
Bar crops and plate	51.00-52.00
Structural & plate, 2 ft	50.00-51.00
Unstripped motor blocks	37.00-38.00
Charging box cast	32.00-33.00
No. 1 wheels	*37.00-38.00*

Railroad Scrap

No. 1 R.R. heavy melt.	47.00-48.00
Rails, 18-in. and under	61.00-62.00
Rails, rerolling	61.00-62.00
Rails, random lengths	58.00-59.00
Angles, splice bars	57.00-58.00

PHILADELPHIA

No. 1 heavy melting	50.00
No. 2 heavy melting	*43.00*
No. 1 bundles	50.00
No. 2 bundles	*40.00*
No. 1 busheling	50.00
Electric furnace bundles	52.00-53.00†
Mixed borings, turnings	36.00
Machine shop turnings	35.00
Short shovel turnings	38.00
Heavy turnings	46.00
Structurals & plate	54.00-56.00
Couplers, springs, wheels	58.00
Rail crops, 2 ft & under	64.00-65.00†

Cast Iron Grades

No. 1 cupola	49.00
Malleable	68.00
Heavy breakable cast	52.00
Drop broken machinery	54.00-55.00

†Nominal

NEW YORK

(Brokers' buying prices)

No. 1 heavy melting	43.00-44.00
No. 2 heavy melting	37.00-38.00
No. 1 bundles	43.00-44.00
No. 2 bundles	32.00-33.00
Machine shop turnings	25.00-26.00
Mixed borings, turnings	27.00-28.00
Short shovel turnings	29.00-30.00
Low phos. (structural & plate)	45.00-46.00†

Cast Iron Grades

No. 1 cupola	43.00-44.00
Unstripped motor blocks	30.00-32.00
Heavy breakable	45.00-46.00

Stainless Steel

18-8 sheets, clips solids	320.00-325.00
18-8 borings, turnings	150.00-160.00
430 sheets, clips, solids	120.00-125.00
410 sheets, clips, solids	100.00-105.00

†Nominal

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*39.00-40.00*
No. 2 heavy melting	32.00-33.00
No. 1 bundles	*39.00-40.00*
No. 2 bundles	30.00-31.00
No. 1 busheling	41.00
Machine shop turnings	*23.50-24.50*
Mixed borings, turnings	*26.50-27.50*
Short shovel turnings	*27.50-28.50*
No. 1 cast	40.50-41.00
Mixed cupola cast	38.00-39.00
No. 1 machinery cast	42.00-43.00

BUFFALO

No. 1 heavy melting	46.00-47.00
No. 2 heavy melting	*38.00-39.00*
No. 1 bundles	46.00-47.00
No. 2 bundles	*35.00-36.00*
No. 1 busheling	**46.00-47.00**
Mixed borings, turnings	*28.00-29.00*
Machine shop turnings	*26.00-27.00*
Short shovel turnings	*29.00-30.00*
Cast iron borings	*28.00-29.00*
Low phos.	*50.00-51.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	46.00-47.00
No. 1 machinery	49.00-50.00

Railroad Scrap

Rails, random lengths	*58.00-59.00*
Rails, 3 ft and under	*64.00-65.00*
Railroad specialties	54.00-55.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	*45.50-46.50*
No. 2 heavy melting	36.00-37.00
No. 1 bundles	*45.50-46.50*
No. 2 bundles	*35.00-36.00*
No. 1 busheling	*45.50-46.50*
Machine shop turnings	29.50-30.50
Mixed borings, turnings	30.00-31.00
Short shovel turnings	31.50-32.50
Cast iron borings	30.00-31.00
Low phos., 18 in.	54.00-55.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Heavy breakable cast	42.00-43.00
Charging box cast	42.00-43.00
Drop broken machinery	54.00-55.00

Railroad Scrap

No. 1 R.R. heavy melt.	*50.00-51.00*
Rails, 18 in. and under	65.00-66.00
Rails, random lengths	58.00-59.00

ST. LOUIS

(Brokers' buying prices)

No. 1 heavy melting	40.50
No. 2 heavy melting	37.00
No. 1 bundles	40.50
No. 2 bundles	32.00
No. 1 busheling	40.50
Machine shop turnings	26.00
Short shovel turnings	*28.50*

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	40.00
Heavy breakable cast	*39.00*
Unstripped motor blocks	38.00
Brake shoes	43.00
Clean auto cast	48.00
Stove plate	40.00

Railroad Scrap

No. 1 R.R. heavy melt.	49.50
Rails, 18 in. and under	64.00
Rails, random lengths	58.00
Rails, rerolling	65.00
Angles, splice bars	54.00

SEATTLE

No. 1 heavy melting	*38.00*
No. 2 heavy melting	*35.00*
No. 1 bundles	34.00
No. 2 bundles	*26.00*
No. 3 bundles	*17.00*
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Short shovel turnings	15.00-16.00
Electric furnace, bundles	*50.00*

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	*45.00*
Heavy breakable cast	*35.00*
No. 1 wheels	35.00
Unstripped motor blocks	*30.00*
Clean motor blocks	*35.00*
Stove plate (f.o.b. plant)	*30.00*
Brake shoes	*30.00*

Railroad Scrap

Rails, random lengths	*38.00*

LOS ANGELES

No. 1 heavy melting	42.00
No. 2 heavy melting	36.00
No. 1 bundles	39.00
No. 2 bundles	32.00
Machine shop turnings	18.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	46.00

SAN FRANCISCO

No. 1 heavy melting	*36.00*
No. 2 heavy melting	*30.00*
No. 1 bundles	*35.00*
No. 2 bundles	*26.00*
No. 1 busheling	*36.00*
Machine shop turning	*20.00-23.00*
Mixed borings, turings	*20.00-23.00*
Cast iron borings	*20.00-23.00*
Short shovel turnings	25.00
Cut structurals	*45.00*
Heavy turnings	*20.00-23.00*
Punchings & Plate scrap	44.00

Cast Iron Grades

No. 1 cupola	*45.00*
Charging box cast	35.00
Stove plate	39.00
Heavy breakable cast	36.00
Unstripped motor blocks	32.00
Brake shoes	35.00
Clean auto cast	*45.00*
No. 1 wheels	39.00
Burnt cast	23.00
Drop broken machinery	50.00

HAMILTON, ONT.

No. 1 heavy melting	45.50
No. 2 heavy melting	41.50
No. 1 bundles	45.50
No. 2 bundles	38.00
Mixed steel scrap	38.00
Mixed borings, turnings	19.00
Rails, remelting	54.50
Busheling, new factory: Prepared	43.50
Unprepared	39.50
Short steel turnings	27.50

Cast Iron Grades†

No. 1 machinery cast	42.00-45.00

†F.o.b., shipping point.

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(*Concluded from page* 243)

able cast, $35; motor blocks, $35; stove plate, $30.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

5525 tons, Clinch river power plant, units 1 and 2, Carbo, Va., Appalachian Electric Power Co., to Bristol Steel & Iron Works Inc., Bristol, Va.

3900 tons, pier 11, Atlantic Basin, Brooklyn, N. Y., to Bethlehem Steel Co., Bethlehem, Pa.; bids direct to the Port of New York Authority, Mar. 1.

3265 tons, section state thruway work, Erie county, New York, through Johnson, Drake & Piper, general contractor, to Ernst Construction Corp., Buffalo.

1850 tons, 12 grade separation structures, Connecticut turnpike project 320-01, Branford-Guilford, Conn., to Pine Brook Iron Works, Scranton, Pa.; Union Building & Construction Co., Passaic, N. J., general contractor.

1515 tons, section state thruway work, Erie county, New York, to Ernst Construction Corp., Buffalo.

1500 tons, generating station, Chicago, through Ebasco Services Inc., New York, to the Allied Structural Steel Cos., Chicago.

1460 tons, four grade separations and two ramp structures, Connecticut turnpike project 311-03, Bridgeport, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Frouge Construction Co., Bridgeport, general contractor.

1395 tons, 11 grade separation structures, Connecticut turnpike project 309-02, Fairfield, Conn., to American Bridge Division, U. S. Steel Corp., Pittsburgh; A. J. Orlando Contracting Co. and Edenwald Construction Co., Whitestone, N. Y., general contractors.

1100 tons, 19-story apartment, 181 E. 73rd Street Corp., Manhattan, New York, to Bethlehem Steel Co., Bethlehem, Pa.

1050 tons, cantilever-type hangar, American Air Lines, Buffalo, to Pittsburgh Bridge & Iron Works, Rochester, N. Y.

1000 tons, plant addition, Hamilton-Standard Division, United Aircraft Corp., Windsor Locks, Conn., to White Plains Iron Works, White Plains, N. Y.

1000 tons, plant, Johns-Manville Co., Santa Ana, Calif., to the Herrick Iron Works, Oakland, Calif.

930 tons, section, Brooklyn-Queens expressway, Woodside, N. Y., through Charles Dachres, general contractor, to American Bridge Division, U. S. Steel Corp., Pittsburgh.

800 tons, power plant, Duluth, Minn., through Ebasco Services Inc., New York, to Allied Structural Steel Cos., Chicago.

700 tons, Oregon Trunk railway, track relocation, The Dalles project, to Kansas City Bridge Co., Kansas City, Mo., fabricating subcontract to Pacific Car & Foundry Co., Seattle.

530 tons, bridges, Florida Turnpike Authority, Dania, Fla., to Bristol Steel & Iron Works Inc., Bristol, Va.

500 tons, power station, Montrose, Mo., through Ebasco Services Inc., New York, to Kansas City Structural Steel Co., Kansas City, Kans.

425 tons, pilot plant, Sylvania Electric Products Inc., Towanda, Pa., to American Bridge Division, U. S. Steel Corp., Pittsburgh.

400 tons, power plant, Sydney, Mont., through Ebasco Services Inc., New York, to Kansas City Structural Steel Co., Kansas City, Kans.

400 tons, psychology building, Brown University, Providence, R. I., to A. O. Wilson Structural Co., Cambridge, Mass.; Gilbane Building Corp., Providence, general contractor.

380 tons, steam plant extension, Houston, through Ebasco Services Inc., New York, to Mosher Steel Co., Houston.

335 tons, Eagle gorge bridge, relocation project, to United Concrete Pipe Corp., Auburn, Wash., by Rumsey & Co., subcontractor for Morrison-Knudsen Co., Seattle, prime contractor.

280 tons, junior high school, Rome, N. Y., through the White Construction Co., New

York, to the Rome Iron Mills Inc., Rome, N. Y.

250 tons, structurals and bars, Henry A. Woolcott School, West Hartford, Conn., to Haarmann Steel Co., Holyoke, Mass. (structurals) and Scherer Steel Co., Hartford, Conn. (bars); A. F. Peaslee Inc., Hartford, general contractor.

250 tons, Du Pont office addition, Newark, Del., to Belmont Iron Works, Eddystone, Pa.

245 tons, power plant, Mountain Creek, Tex., through Ebasco Services Inc., New York, to the Austin Bros. Steel Co., Dallas.

230 tons, state bridge work, Union county, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

200 tons, building, New Orleans, through Ebasco Services Inc., New York, to Jones & Laughlin Steel Corp., Pittsburgh.

195 tons, one-story commercial building, 170 W. 233rd St., New York, through Steel Master Inc., general contractor, to Bethlehem Steel Co., Bethlehem, Pa.

180 tons, woodroom, Continental Can Co., Hopewell, Va., through Tidewater Construction Co., to Bristol Steel & Iron Works Inc., Bristol, Va.

155 tons, store building, R. H. Stearns Co., Brookline, Mass., to A. O. Wilson Structural Co., Cambridge, Mass.

155 tons, state bridge work, Lackawanna county, Pa., to Pine Brook Iron Works, Scranton, Pa.

150 tons, bank building, Watertown Federal & Savings Co., Watertown, Mass., to A. O. Wilson Structural Co., Cambridge, Mass.

150 tons, state bridge repairs, Northumberland county, Pa., to High Welding Co., Lancaster, Pa.

STRUCTURAL STEEL PENDING

5500 tons, interstate bridge, Vancouver, Wash.; Guy F. Atkinson Co., South San Francisco, Calif., low bidder to the Oregon Highway Commission, $5,564,180; for approach alterations, low at $1,117,000.

4000 tons, approaches to the Morrison and Hawthorne bridges, Portland, Oreg.; new bid date, Mar. 27, to Multnomah county commissioners, Portland, Oreg.

1600 tons, power plant extension, unit No. 2, Tampa Electric Co., Tampa, Fla.; Stone & Webster Engineering Corp., Boston, contractor-engineer.

1080 tons, Navy, east and west yard, General Stores Supply, Philadelphia.

500 tons, grandstand structure, Walla Walla, Wash.; general contract to L. D. Proctor, Walla Walla, low at $132,045.

440 tons (140 tons wide flange and 300 tons bulb angles), Navy, east and west yards; bids in to General Stores Supply Office, Philadelphia.

121 tons, including 45 tons, reinforcing, rehabilitation of Nyssa pumping plant; bids to Bureau of Reclamation, Denver, Apr. 11.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1975 tons, substructure, Bridgeport harbor bridge, Connecticut turnpike project 311-01, Bridgeport, Conn., to Igoe Bros., Newark, N. J.; A. S. Wikstrom Inc., Skaneateles, N. Y., general contractor; 5950 tons, steel piles, including 625 tons with points, to Bethlehem Steel Co., Bethlehem, Pa.

1460 tons, state highway bridges, Neponset Circle to river, Southeast expressway, Dorchester district, Boston, to Truscon Steel Division, Republic Steel Corp., Boston; M. DeMatteo Construction Co., Quincy, Mass., general contractor.

1335 tons, 12 grade separations and three bridges, Connecticut turnpike project 319-01, East Haven-Branford, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; M. A. Gammino Construction Co., Providence, R. I., general contractor; 900 tons, steel piles, to Bethlehem Steel Co., Bethlehem, Pa.

1260 tons, state highway bridges, including Providence river span, North-South freeway, Providence, R. I., to Plantations Steel Co., Providence, R. I.; Gammino Construction Co., Providence, general contractor.

1125 tons, steel piles, eight grade separation structures, Connecticut turnpike project 302-02, Greenwich, Conn., to Bethlehem Steel Co., Bethlehem, Pa.; Slattery Contracting Co., New York, general contractor.

775 tons, 12 grade separations, Connecticut turnpike project 320-01, Branford-Guilford, Conn., to Truscon Steel Division, Republic Steel Corp., New York; Union Building & Construction Co., Passaic, N. J., general contractor; 315 tons, steel piles, to Bethlehem Steel Co., Bethlehem, Pa.

400 tons, administration building, Delaware River Port Authority, in connection with the operation of the Philadelphia-Gloucester bridge, to American Steel Engineering Co., Philadelphia, through McCloskey & Co., general contractor, Philadelphia.

270 tons, three state bridges, Fall River-Boston expressway, Avon - Brockton - Stoughton, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; S. & M. Construction Co., Providence, R. I., general contractor.

250 tons, state highway bridges, Northeast expressway, contract No. 4, Revere, Mass., to Truscon Steel Division, Republic Steel Corp., Boston; M. DeMatteo Construction Co., Quincy, Mass., general contractor.

180 tons, Our Lady of Ransom Church, Philadelphia, to Taylor-Davis Inc., Philadelphia.

120 tons, Washington state overcrossing, Thurston county, to Bethlehem Pacific Coast Steel Corp., Seattle; Troy Burnham, general contractor.

REINFORCING BARS PENDING

1230 tons, North Allen project, Philadelphia Housing Authority, Philadelphia, Paul Tishman, New York, general contractor.

1140 tons, interstate bridge, Vancouver, Wash.; bids in.

650 tons, office building, Gulf Oil Co., Philadelphia, Hughes-Foulkrod, Philadelphia, general contractor.

500 tons, office, Campbell Soup Co., Camden, N. J., Turner Construction Co., general contractor.

286 tons, junior high school, Marple-Newton, Pa., Wark Co., Philadelphia, general contractor.

150 tons, Washington state highway projects; bids to Olympia, Mar. 20.

Unstated, igloos, storehouses and other structures, Glasgow, Mont., Air Base; Sound Construction & Engineering Co., Seattle, is low at $3,027,840 to the U. S. Engineer, Walla Walla, Wash.

Unstated, Oregon road projects, general contracts as follows: Josephine county, 360-ft bridge, Tom Lillebo, Reedsport, Oreg., $140,243; Lincoln county, 466-ft span, Tom Lillebo, $149,059; Marion county, 122-ft and 77-ft bridges, Tom Lillebo, $71,274.

PLATES . . .

PLATES PLACED

3000 tons, piling furnished by the government; first stage cofferdam project, Ice Harbor power project, awarded to Guy F. Atkinson Co., South San Francisco, Calif., low at $1,362,377 to the U. S. Engineer, Walla Walla, Wash.

173 tons, 6500 ft of piling, Eagle gorge dam, Washington state, purchased from various interests by Rumsey & Co., Seattle, subcontractor to Morrison-Knudsen Co., Seattle.

PLATES PENDING

2400 tons, 36 and 24-in. water pipe, bids to Seattle postponed from Feb. 29 to Mar. 7.

200 tons, storage and refueling facilities, Elmendorf Air Base, Alaska; general contract, including other items, to M. B. Contracting Co., Seattle, low at $8,994,575.

180 tons, hull, Navy; bids Mar. 20, General Stores Supply, Philadelphia; also 100 tons of galvanized sheets; 105 tons, stainless sheets, Mar. 21.

155 tons, floor plates, Navy, east and west yards; bids Mar. 15 to General Stores Supply Office, Philadelphia; also, 55 tons, hull plates, bids in.

100 tons, including shapes, 97-ft steel ferry for Alaska Highway Department; bids rejected; new call to William Garden, naval architect, Seattle, Apr. 3.

Unstated, fuel storage, Paine Air Field, Everett, Wash.; general contract to Harold J. Kaeser, Seattle, low at $119,896.

PIPE . . .

CAST IRON PIPE PENDING

300 tons, 12,000 ft of 12 and 8 in., cement lined; bids to John L. Sugars, city clerk, Everett, Wash., Mar. 14.

200 tons, 6 in.; bids to Vancouver, Wash., Mar. 12.

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EXCLUSIVE REPRESENTATIVES

For soliciting contract wire work (fan guards, oven and refrigerator shelves, baskets, etc., etc.), in New England, West Pennsylvania, Ohio, West Virginia, Mid-Western and Southern States.
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CLASSIFIED

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DEVELOPMENT ENGINEER
Well established producer and fabricator of welded steel tubing requires aggressive engineer with mechanical and electrical background and experience. Will be in complete charge of Production Development, Tools, Dies and Equipment and General Plant Engineering. Good salary and other benefits. Replies confidential to Box 375, STEEL, Penton Bldg., Cleveland 13, Ohio.

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COMMISSION MANUFACTURERS REPRESENTATIVE
A MEDIUM SIZED OPEN HEARTH STEEL FOUNDRY SEEKS REPRESENTATION IN THE NEW YORK, NEW JERSEY AREA. ONE CALLING ON MACHINERY MANUFACTURERS AND FABRICATORS AND KNOWN USERS OF STEEL CASTINGS PREFERRED. STRAIGHT COMMISSION. WRITE BOX 380, STEEL, PENTON BLDG., CLEVELAND 13, OHIO.

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A MEDIUM SIZED OPEN HEARTH STEEL FOUNDRY SEEKS REPRESENTATION IN BALTIMORE, PHILADELPHIA, YORK AND HARRISBURG, PA. AREA. ONE CALLING ON MACHINERY MANUFACTURERS AND FABRICATORS AND KNOWN USERS OF STEEL CASTINGS PREFERRED. STRAIGHT COMMISSION. WRITE BOX 381, STEEL, PENTON BLDG., CLEVELAND 13, OHIO.

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SALESMAN
After six years' technical sales experience with manufacturers agent is interested in companies seeking representation in Northern Ohio. Reply Box 383, STEEL, Penton Bldg., Cleveland 13, Ohio.

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Considerable experience in export department of steel producer with annual sales of $30 million in 75 countries makes me qualified to apply for you these same tested methods of foreign sales management, export advertising, credits, and traffic. Reply Box 390, STEEL, Penton Bldg., Cleveland 13, Ohio.

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All classifications other than "Positions Wanted," set solid, 50 words or less $15.00, each additional word .30; all capitals, 50 words or less $19.20, each additional word .38; all capitals leaded, 50 words or less $23.40, each additional word .47. "Positions Wanted" set solid, 25 words or less $3.60, each additional word .14; all capitals, 25 words or less $4.50, each additional word .18; all capitals leaded, 25 words or less $5.40, each additional word .22. Keyed address takes seven words. Cash with order necessary on "Positions Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.

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GIDDINGS & LEWIS
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Fond du Lac, Wisc.

"... has enabled us to utilize a much greater area of storage space ... **KRANE KAR** will be the key element in the operation of new storage areas. Enables us to unload railroad cars and enclosed top highway trailers in minutes where it formerly took hours. We unloaded a car containing 65,000 pounds of flat hammered forgings in three hours. Recommend it to anyone requiring this type of equipment."

Ask about the New
Lease-a-KRANE KAR-Plan
... 1 to 3 Year Lease with Option to Purchase.

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We carry your inventory.
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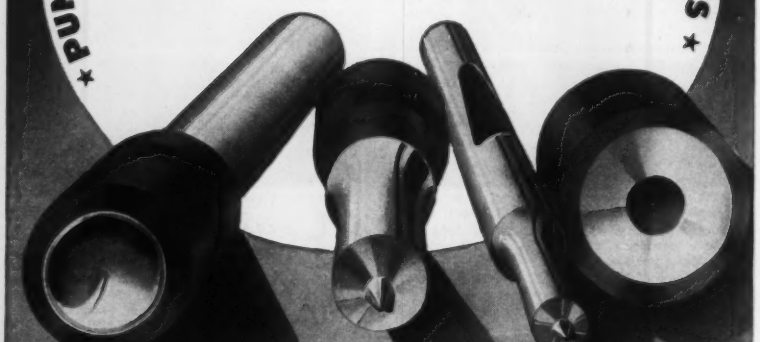

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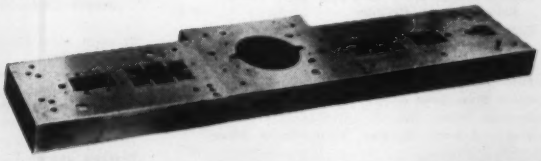
How to Know BEFORE DELIVERY

What Results You'll Get from the TOOL AND DIE STEELS You Order



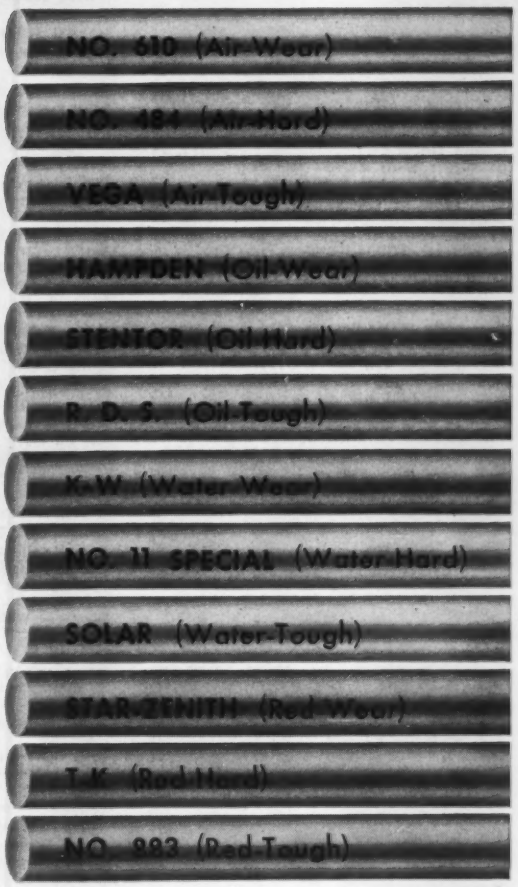
Maximum performance from your tools and dies is possible *only* when your design, toolmaking and heat treating are backed by sound, top quality tool and die steels. You control the first *three factors*. But how can you be sure, *before delivery*, that the die steels you order will deliver the *results* you want?

To give you this assurance, Carpenter puts its "mark" on *every* grade of die steel it produces. This mark, or brand name, is the sign of *consistent Carpenter quality*.

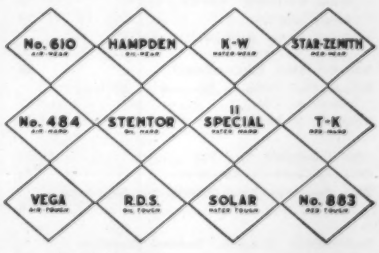
In back of it, at Carpenter, is a long list of painstaking controls. These include Hot Acid Etch Inspection, Ultrasonic Testing, Tough Timbre and Hardenability Testing. And that's only the start of many *extras* you get with Carpenter brands of tool and die steels . . . extras that enable you to predict *in advance* results you'll get on the job!

Accurate selection is one example. With the Carpenter-pioneered Matched Set Method your men take the guesswork from choosing the one steel best suited to the job. *Trouble-free heat treating* is another. Through tests and controls, Carpenter has simplified the heat treatment of Matched Tool and Die Steels beyond anything previously known. Further, a wealth of printed information gives you a "blueprint" to minimize costly heat treating hazards.

All this . . . and more, stands behind every bar of Carpenter Matched Tool and Die Steel. So, when you see any of these Carpenter brand names, you can feel *safe* in the knowledge you're getting *full value* from your investment. Specify Carpenter Matched Tool and Die Steels. It costs you no more to be *sure!*



And each bar is colored *full length* with a distinctive color for each grade. Here's *positive* identification!



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THE CARPENTER STEEL CO., 139 W. Bern St., Reading, Pa.
Mill-Branch Warehouses and Distributors in Principal Cities Throughout the U.S.A. and Canada

BIG FACILITIES

WITH PRECISION TOOLS AND WORKMANSHIP

● This is one section of Aetna-Standard's big plant at Ellwood City, Pa. A detail would reveal big planers and small planers; turret lathes and boring mills; a toolmaker's shop and a pattern shop; a foundry and several assembly bays . . . welders, fitters, electricians and other craftsmen.

You would see all types of weldments coming from the big weld shop. You would see many machinists at work. You would see excellent facilities inside the plant for shipping by rail or truck.

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To meet their responsibility to customers in steel, copper, brass, aluminum, rubber and plastic, Aetna-Standard in recent months has increased its productive capacity by 40%, the fourth major expansion in 15 years.

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Cinder cars on TIMKEN® bearings start faster—keep rolling longer

TIMKEN® tapered roller bearings in the journal boxes of William B. Pollock Company cinder cars reduce starting resistance by 88% when compared with friction bearings. And these cars roll easier, keep *on* rolling with minimum maintenance and lubrication, load after load, day after day.

With Timken bearings on the job, mill operators no longer need worry about scored axles and worn-out thrust washers. Friction is minimized by the true rolling motion and incredibly smooth surface of Timken bearings.

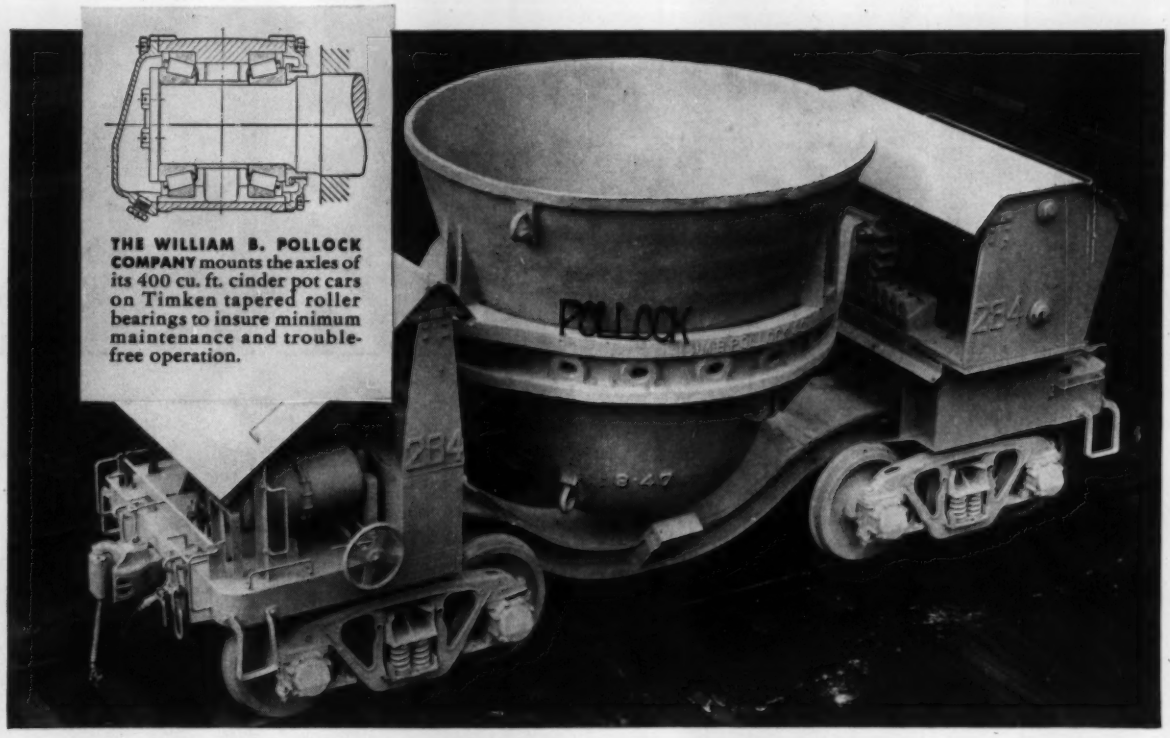
Full line contact between rollers and races gives Timken bearings tremendous load-carrying capacity. Tapered design enables them to carry any combination of radial and thrust loads. And case-hardened surfaces and tough inner-cores permit rollers and races to resist wear and take heavy shock loads. Cars stay on the job with minimum maintenance.

Because they keep housing and axle concentric, closures are made more effective in keeping lubricant in—dirt out. Timken bearings roll the load and cut the cost of lubricant and maintenance time so necessary to keep old-style friction bearings sliding.

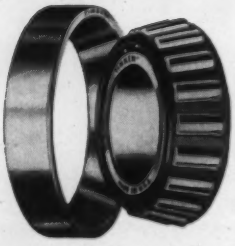
Under normal usage, Timken bearings last the life of the car for these reasons: (1) they are carefully engineered for the job, (2) they're made of Timken alloy steel, and (3) they're precision manufactured.

No other bearings can give you *all* the advantages you get from Timken bearings. Remember, the Timken Company is America's *only* bearing manufacturer that makes its own steel. Be sure the machines you buy use bearings carrying the trade-mark "Timken". It's your assurance of high quality. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



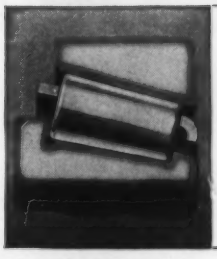
THE WILLIAM B. POLLOCK COMPANY mounts the axles of its 400 cu. ft. cinder pot cars on Timken tapered roller bearings to insure minimum maintenance and trouble-free operation.



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

Only Timken tapered roller bearings have these advantages: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. Timken fine alloy steels.

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION